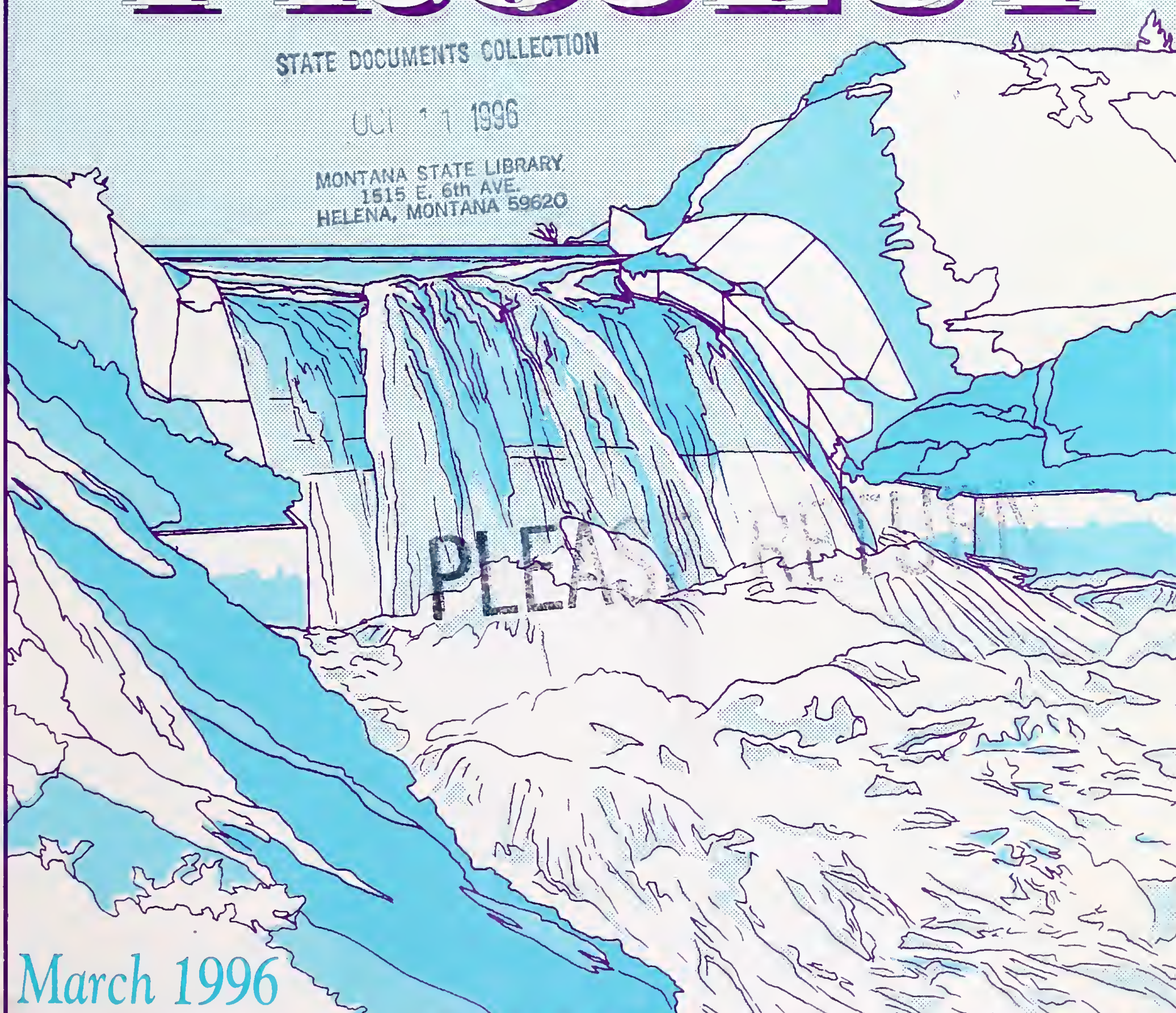
TONGUE RIVER BASIN PROJECT



March 1996

Final Environmental Impact Statement

ABBREVIATIONS AND ACRONYMS

ACHP: Advisory Council on Historic Preservation

af: acre-feet

afy: acre-feet per year

AVF: Alluvial Valley Floor

BIA: Bureau of Indian Affairs

BLM: Bureau of Land Management

BN: Burlington Northern

CFR: Code of Federal Regulations

cfs: cubic feet per second

CHR: Community Health Representative

COE: U.S. Army Corps of Engineers

dBA: A-weighted decibels

DFWP: Department of Fish, Wildlife and Parks

DEQ: Department of Environmental Quality

DNRC: Department of Natural Resources and Conservation

DSL: Department of State Lands (formerly, now part of DEQ)

EAP: Emergency Action Plan

EIS: Environmental Impact Statement

EMT: Emergency Medical Technician

EMTD: Emergency Medical Technician certified to operate defibrillator equipment

EPA: Environmental Protection Agency

FAS: Federal Aid Secondary

FHWA: Federal Highway Administration

ft: feet

FY: fiscal year

gpm: gallons per minute

HABS: Historic Architectural Building Survey

HUD: Housing and Urban Development

IHS: Indian Health Service

ISC: Insurance Services Office

Leq: Average noise level

Leq[h]: Leq measured over a 1-hour period

LIHEAP: Low Income Housing Energy Assistance Program

MCA: Montana Codes Annotated

MDT: Montana Department of Transportation

MEPA: Montana Environmental Policy Act

mg/1: milligrams per liter

MPDES: Montana Pollutant Discharge Elimination System

MPH: miles per hour

NEPA: National Environmental Policy Act

NHPA: National Historic Preservation Act

NRHP: National Register of Historic Places

PAR: population at risk

PHS: Public Health Service

PM-10: 10 micron or smaller suspended particulates

PMF: probable maximum flood

PMP: probable maximum precipitation

ppm: parts per million

PSD: Prevention of Significant Deterioration

QRU: quick response unit

RCC: roller-compacted concrete

SDF: spillway design flood

SHPO: State Historic Preservation Office

T&Y: Tongue and Yellowstone

TDS: total dissolved solids

TERO Agreement: Northern Cheyenne Labor Relation Accord and Employment Preference Agreement

Tribe: Northern Cheyenne Tribe

TRR(C): Tongue River Railroad (Company)

TSP: total suspended particulates

ug/l: micrograms per liter

ug/m^3: micrograms per cubic meter

U.S.C.: U.S. Code

vpd: vehicles per day

USBR: U.S. Bureau of Reclamation

USFWS: U.S. Fish and Wildlife Service

WMA: Wildlife Management Area

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Dear Reader:

The project sponsors--the Montana Department of Natural Resources and Conservation, Northern Cheyenne Tribe, and the U.S. Bureau of Reclamation--prepared this *Tongue River Basin Project Final Environmental Impact Statement* (final EIS), incorporating comments received from the draft EIS released to the public in June 1995. The Tongue River Basin Project includes repair and enlargement of Tongue River Dam, partial fulfillment of the Northern Cheyenne Indian Reserved Water Rights Settlement Act of 1992, and conservation, development, and enhancement of fish and wildlife resources in the basin.

The final EIS includes letters of comment and comments from public hearings on the draft EIS, along with the responses of the project sponsors. Release of the final EIS will be followed by a 30-day no-action period. After this period, the project sponsors will issue a Record of Decision stating the final course of action for the project.

Copies of the final EIS can be obtained from:

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Thank you for your interest in this project.

Sincerely,

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TONGUE RIVER BASIN PROJECT
ENVIRONMENTAL IMPACT STATEMENT

SOUTHEASTERN MONTANA

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MARCH 1996

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SUMMARY

INTRODUCTION

This summary presents a condensed version of information contained in the Tongue River Basin Project final environmental impact statement (final EIS). The final EIS identifies and analyzes probable impacts to the human environment that would result from the proposed Tongue River Basin Project. The project includes the repair and enlargement of Tongue River Dam, the partial fulfillment of the Northern Cheyenne Indian Reserved Water Rights Settlement Act of 1992 (Settlement Act), and the conservation, development, and enhancement of fish and wildlife resources and habitat in the Tongue River Basin. The final EIS was prepared jointly by the Montana Department of Natural Resources and Conservation (DNRC), the Northern Cheyenne Tribe (Tribe), and the United States Bureau of Reclamation (USBR) to comply with the National Environmental Policy Act (NEPA) and the Montana Environmental Policy Act (MEPA).

A draft EIS regarding the proposed project was distributed for public and agency review on June 5, 1995. Following an 82 day review period, this final EIS was prepared in response to comments received on the draft EIS. It provides responses to comments received on the draft EIS, updates project design details, and refines environmental analyses contained in the draft EIS. Most notable project updates involve the inclusion of an auxiliary low-level outlet works under the Roller Compacted Concrete (RCC) alternative, movement of Aggregate Site No. 1 from Sand Point to Campers Point, provision of limited access to recreational cabins during construction, and revisions to the plan for upgrading and relocating portions of Big Horn County Road No. 380 as part of project-related construction. Additional analysis of environmental impacts to wetlands in the project area, of impacts related to the development of the Tribe's Compact water, and impacts from construction activities within Tongue River State Park also are included in the final EIS. In addition, consideration was given to several new alternatives, but these were dropped from further consideration because they failed to meet the terms of the Compact, were infeasible, or cost prohibitive. After circulation of the final EIS and following a required 30-day no-action period, a Record of Decision (ROD) will be issued stating the project sponsors' (DNRC, the Tribe, and USBR) final course of action.

THE EIS PROCESS

The purpose of an EIS is to provide the information, background, and facts necessary for individuals/agencies to make informed decisions regarding a proposed project (in this case the Tongue River Basin Project). Procedures governing the EIS analysis process are defined in administrative rules for implementing NEPA and MEPA. These laws require an EIS to be prepared if a proposed action has the potential to significantly affect the quality of the human environment. Because the Tongue River Basin Project involves federal and state agencies, this draft EIS was written to fulfill the requirements of both NEPA and MEPA and the associated administrative rules and regulations for their implementation.

PURPOSE AND NEED

The Tongue River Basin Project is being proposed to alleviate dam safety concerns and protect downstream lives and property, to protect all existing water rights held in the Tongue River Reservoir, and to provide up to an additional 20,000 acre-feet of water to the Tribe. An additional requirement of the project involves the enhancement of fish and wildlife resources and habitat in the Tongue River Basin. All project goals are components of the Settlement Act, which ratified the Northern Cheyenne - Montana Water Rights Compact (Compact) entered into on June 11, 1991 by the Northern Cheyenne Tribe and the state of Montana.

As directed by the Settlement Act, USBR assumed lead federal responsibility under NEPA for project environmental compliance activities, and DNRC assumed similar state responsibilities under MEPA. Although both USBR and DNRC consider fulfillment of the Settlement Act and elimination of dam safety

concerns the major goals of the project, each agency has certain legal obligations to satisfy.

The federal purpose of the Tongue River Basin Project is to protect the following Indian Trust Assets (legal interests in property and rights held in trust by the United States for Indian tribes or individuals):

- The Northern Cheyenne Tribe's existing water supplies held in the Tongue River Reservoir.
- The safety of Tribal members living downstream and their lands.
- Additional Compact water for the Tribe from the Tongue River Basin.

USBR has identified the protection of trust assets of the Tribe as the federal action requiring NEPA compliance for the Tongue River Basin Project. A further purpose of the project as required by legislation is to provide for the conservation, development, and enhancement of fish and wildlife resources and habitat in the Tongue River Basin. Project-related enhancement activities, although required by the Settlement Act, can be considered a secondary project goal and one that is not necessarily related to the actions addressed in this EIS. This stems from the fact that enhancement activities will not involve the increased reservoir storage water related to rehabilitating the dam and increasing its spillway crest elevation. Environmental compliance related to enhancement activities will be conducted when specific projects are proposed.

From the federal government's perspective, the need for this action is as follows:

- The Tribe has an existing 7,500 afy storage right in Tongue River Reservoir, which would be lost with failure of the dam.
- Failure of the dam would endanger the lives of Tribal members and their property. Tongue River Dam has been classified as unsafe by the U.S. Army Corps of Engineers (COE) due to inadequate spillway capacity and high hazard because of the potential for loss of life should the dam fail.
- Without increased storage capacity in Tongue River Reservoir, the State would be unable to provide up to 20,000 afy allocated to the Tribe under the Compact. Other sources of water would be insufficient to meet the needs.

Legislation did not identify specific fish and wildlife habitat enhancement needs; as these needs are identified, environmental review will proceed and where adverse environmental impacts are not significant, the $4.6 million enhancement fund will be made available for specific projects.

The purpose for the State of Montana's action to be addressed under MEPA is:

- To maintain the ability to deliver all existing water use contracts held in the Tongue River Reservoir.
- To provide a safe dam to protect lives and property downstream.
- To provide increased reservoir storage that, in combination with exchange water and existing unallocated reservoir storage, would allow for the delivery of up to an additional 20,000 afy of water to the Tribe.

The state believes the action is necessary because:

- The Tongue River Water Users Association has 32,500 afy of stored water rights in Tongue River Reservoir and the Tribe has 7,500 afy of existing stored water rights. With failure of the dam, these rights (totaling 40,000 afy) would be lost.
- The Tongue River Dam has been classified as unsafe due to inadequate spillway capacity and high hazard because of the potential for loss of life should the dam fail. Rehabilitation of the dam is necessary to protect all downstream lives and property.
- The Northern Cheyenne-Montana Water Rights Compact requires Montana to deliver up to 20,000 afy of storage and exchange water to the Tribe over and above the Tribe's existing water purchase contract for 7,500 afy.

DEVELOPMENT OF ALTERNATIVES

Under NEPA and MEPA, the project sponsors (USBR, the Tribe, and DNRC) are required to consider the

environmental effects of a proposed action, as well as all reasonable alternatives to that action. Two alternatives that also must be evaluated in an EIS are the proposed action -- in this case rehabilitating Tongue River Dam, fulfilling the Settlement Act water right, and enhancing fish and wildlife habitat -- and the no-action alternative. The no-action alternative simply would maintain existing conditions in the basin.

Public participation has been an integral component of the preparation of the Tongue River Basin Project EIS. Public meetings regarding the Compact have been held since 1980 throughout the Tongue River Basin, and several meetings were held in the early 1990s to provide information on the progress of Compact negotiations and to ask the public for questions or comments.

Three open house meetings were held in October 1991, to inform the public about studies for rehabilitating the dam. These meetings were held in Miles City and Ashland , Montana, and Sheridan, Wyoming. In March 1993, the project sponsors conducted nine scoping meetings in the project area to determine issues and concerns related to the Tongue River Basin Project and to identify possible alternatives and mitigations to be included in this EIS. In addition to public scoping, a meeting was held on March 23, 1993 to discuss agency scoping issues.

From this process, the project sponsors identified several significant issues that would be used to drive alternative formulation (including proposed mitigations). Issues emerged in several resource areas, including recreation, aquatics/fisheries, hydrology, socioeconomics, and use of Compact water by the Tribe. A synopsis of the issues is presented below:

- Effects on aquatic resources within the reservoir and river upstream and downstream of the reservoir;
- Effects on the water rights settlement with the Northern Cheyenne Tribe;
- Impacts of flood events;
- Effects on Decker Coal mines adjacent to the reservoir;
- Effects of dam failure on human safety and property downstream of the project;
- Indian trust assets/Federal trust asset responsibility;
- Impacts to state and federal governments from the cost of construction; and
- Short-term effects on recreation resources;
- Potential effects of Tribal water development scenarios.

The alternatives development process identified three alternatives, including no action, for consideration in this EIS. The two action alternatives are: 1) Labyrinth Weir Spillway, and 2) Roller-Compacted Concrete (RCC) Spillway. Both action alternatives would rehabilitate or replace the inadequate Tongue River Dam spillway and raise its crest elevation 4 feet. The resultant increase in Tongue River Reservoir capacity would provide additional water to the Tribe and thus partially fulfill the provisions of the Settlement Act. A fundamental component of both action alternatives provides for the enhancement of fish and wildlife habitat in the Tongue River Basin.

Construction of either action alternative would last about 2 years. Construction employment would include a Tribal hiring preference requiring that up to 75 percent of the local workforce be comprised of Tribal workers. **Table S-1** provides a detailed comparison of major project components by action alternative.

At the initiation of EIS preparation, the project sponsors had not identified a preferred alternative. Late in the process of preparing the draft EIS, the project sponsors identified Alternative 2, RCC Spillway as the preferred alternative.

In addition to the alternatives analyzed in the EIS, several additional alternatives were considered but dismissed during the early stages of EIS preparation. These alternatives were technically or economically infeasible, or may have resulted in greater environmental effects. The range of alternatives considered but dismissed included:

- purchasing water to satisfy the Settlement Act water right;
- constructing a new dam at another location;
- rehabilitating the dam to its existing capacity and delaying efforts to increase reservoir capacity until the Tribe identified actual water uses;
- rehabilitating the dam and increasing reservoir capacity but postponing filling of the reservoir beyond its present capacity until the Tribe identified actual water uses;
- finding alternative sources of water to impound or develop for satisfaction of Settlement Act water rights; and
- repairing the dam and giving a cash settlement to the Tribe in lieu of additional water.

EXISTING ENVIRONMENT

Tongue River Dam and Reservoir are located in Big Horn County in southeastern Montana, about 5 miles from the Montana/Wyoming border (**see Figure S-1**). The nearest towns are Ashland, Montana, and Sheridan, Wyoming.

Tongue River Reservoir is located in the Tongue River Valley where topography ranges from the flats along the river to surrounding steep and eroded terrain. The reservoir is about 8 miles long and 1 mile wide, with an average depth of 20 feet. From the reservoir, the river flows northeast about 190 miles to its mouth on the Yellowstone River at Miles City. The southern boundary of the Northern Cheyenne Indian Reservation lies about 15 miles north of the dam. The Tongue River and its tributaries are the major sources of surface water in the area.

The reservoir and river support a variety of fish -- mostly warm-water species. Riparian vegetation along the river and on some locations around the reservoir provides habitat for both large and small mammals and some game species. Waterfowl and some threatened and endangered species such as bald eagles inhabit the reservoir area and the river corridor.

TABLE S-1: Project Components of Construction Alternatives

	Construction Alternatives
Spillway design flood outflow, cfs	100,000
Maximum reservoir elevation, feet	3,428.4
Maximum reservoir storage, acre-feet	80,000
Maximum reservoir storage during construction, acre-feet[1]	35,000/45,000
Minimum reservoir storage during construction, acre-feet	9,000
Coffer dams upstream and downstream	yes
Auxiliary low level outlet works	yes
New Inundation, acres	400
Peak 100-year flood outflow, cfs	18,928/11,135
Average downstream floodplain width, feet	487/387
Average downstream floodplain depth, feet	13.5/10.8
Aggregate Site No. 1 disturbed acres (max)	60
Aggregate Site No. 2 disturbed acres (max)	0/10
Staging area disturbed acres (max)	36
County Road No. 380 disturbed, miles	7.5
Tongue River State Park relocated	yes
Tongue River Canyon fishing access site disturbed during construction	yes
Coal mine mitigation required	yes
Structure and shore erosion protection required	yes
Peak employment, persons	26/16
Construction cost, million $	27/18

Note: [1] *Depending on inflows to the reservoir and other safety considerations*
[2] *Components between alternatives are the same except where differences are separated by a "/" between entries*

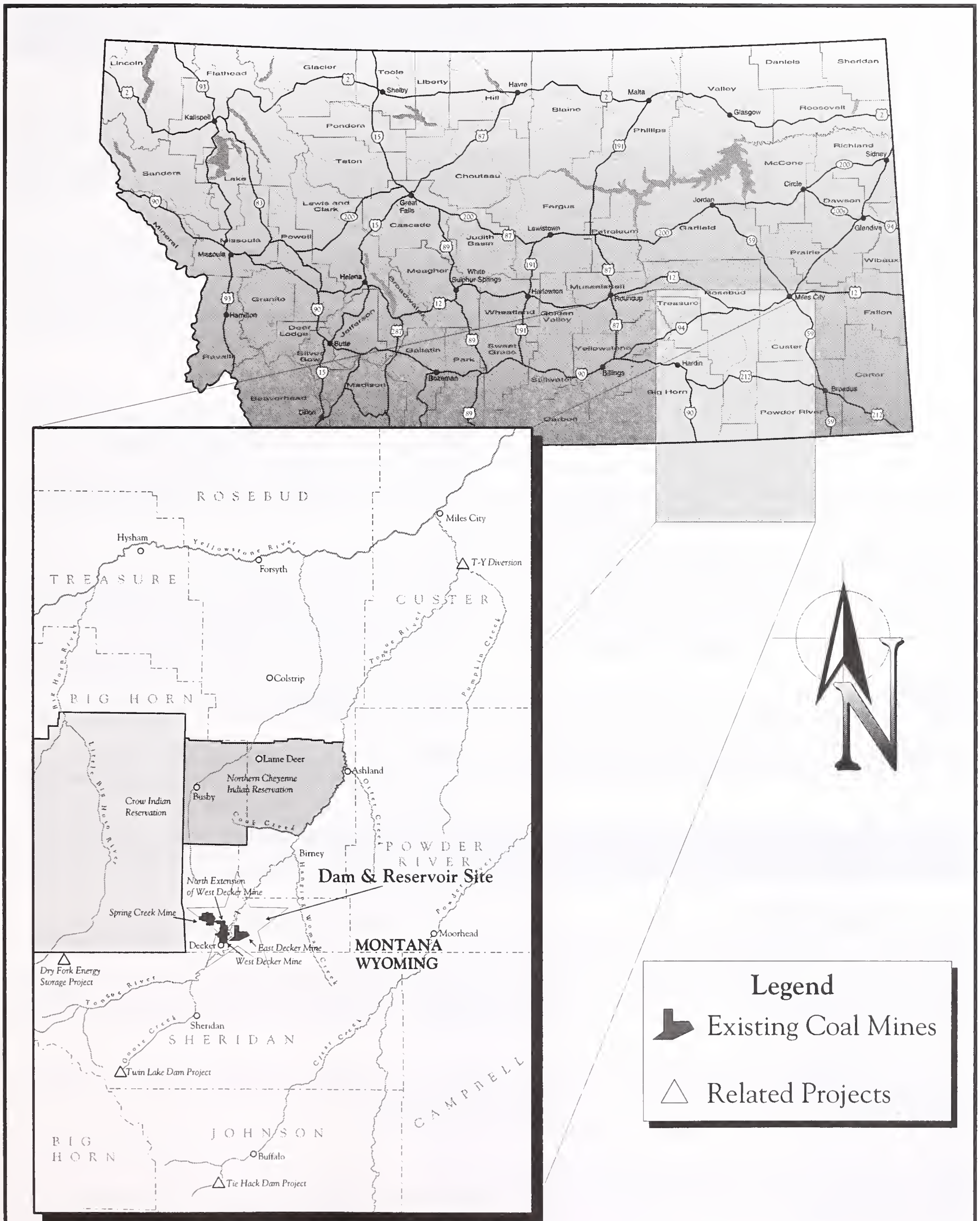


Figure S-1. General Vicinity Map

Primary land use around the reservoir and in the Tongue River Basin is agriculture. The mining, agriculture, government, and services sectors provide the majority of basin employment. Recreational use of Tongue River State Park, located on the west shore of the reservoir, has increased steadily since 1989, reflecting the popularity of the park as a regional recreational resource. Boating, fishing, and camping are the primary activities at the state park. A more detailed description of all resources in the project area is provided in the EIS.

ENVIRONMENTAL CONSEQUENCES

Table S-2 presents a summary of the principal impacts that would occur under the two action alternatives. Alternative 3, (no action) is not included since impacts would be negligible without the project, except in the case of dam failure. The impact statements in **Table S-2** are quantified and described in greater detail in **Chapter 4**. Impacts of the two action alternatives, as presented in **Table S-2**, are similar with the exception of the following:

Hydrology

Peak outflow under Alternative 1 would increase over existing conditions. There would be no appreciable change in peak discharges from design floods under Alternative 2.

Vegetation

Increased flood flows associated with Alternative 1 could favor maintenance of downstream riparian communities while Alternative 2 would approximate existing conditions. The excavation of aggregate for construction would destroy up to 60 acres of vegetation under Alternative 1 and up to 70 acres of vegetation under Alternative 2.

Aggregate Material Sources

Alternative 1 would require the mining of aggregate at Site No. 1 while Alternative 2 could require sites 1 and 2 to be mined.

Construction Employment

Employment required during the construction of Alternative 1 would be slightly higher than for Alternative 2. Wages and salaries are estimated at $1.9 million for Alternative 1 and $1.7 million for Alternative 2.

Appearance

Alternative 1 would differ in appearance from the existing spillway due to its zigzag crest. Alternative 2 would have a different dam embankment profile than the existing dam due to the secondary and emergency spillways.

Project Cost

Alternative 1 is estimated to cost approximately 45 percent more than Alternative 2.

TABLE S-2: Summary of Impacts by Construction Alternative and Resource[1]

Impact Topic	Construction Alternatives
Air Quality	
Impacts on air quality from project construction and operation	Impacts from construction and wind erosion of exposed mudflats during drawdown; effects negligible to minor in the short term and negligible in the long term
Geotechnical Stability	
Impacts on factors of safety relating to the dam embankment	Factors of safety for construction range from 2-2.8; effects negligible in the short and long terms
Soils	
Impacts to shoreline soils from higher water levels in the reservoir	Newly exposed shoreline would erode until stable beach slope is reached; 7.1 miles of shoreline rated moderate - high erosion potential

TABLE S-2 *continued:* **Summary of Impacts by Construction Alternative and Resource[1]**

Impact Topic	Construction Alternatives
***Soils** continued*	
Impacts to prime and unique agricultural land from higher water levels in the reservoir	41 acres of "prime if irrigated" lands would be affected; effects minor in the short and long terms
Impacts to soil productivity in project-related surface disturbance areas (especially aggregate mines and staging areas)	Productivity could be affected on up to 167 acres; effects moderate to major in the short term and minor in the long term
Impacts on soils from relocation of the State Park	Effects minor in the short and long terms
Hydrology	
Impacts on reservoir elevations and storage from proposed reservoir operation	Storage would increase from 67,000 to 80,000 af; effects major and significant in the short term and major, beneficial and significant in the long term
Short-term impacts to downstream releases during construction	June peak releases would be about 200 cfs more than historic; July-August releases would be about 120 cfs less than historic; effects moderate in the short term
Long-term impacts to downstream releases following construction (with full Tribal development)	June peak releases would be about 200 cfs more than historic; releases would be slightly lower the rest of the year; effects moderate in the long term
Impacts on reservoir ice from increased reservoir water levels	Effects minor in the short and long terms
Impacts on upstream river ice from increased reservoir water levels	Effects minor to moderate in the short term and minor in the long term
Short-term impacts on coal mine pits from decreased reservoir water levels during construction	Decreased seepage into mine pits; effects minor to moderate and beneficial in the short term
Long-term impacts on coal mine pits from increased reservoir water levels	Seepage rate would increase from 200 gpm at south end up to 3,000 gpm for future pits at north extension; effects negligible in the long term
Impacts of increased mine pit discharges on reservoir and downstream water quality	Discharge would range as high as 3,740 gpm and TDS could average 1,825 mg/l, raising average TDS of flows into reservoir from 440-460 mg/l; effects negligible in the short and long terms
Short-term impacts on shallow groundwater from decreased instream flows during construction	Change in recharge from river to groundwater would be negligible to minor
Long-term impacts to groundwater from increased reservoir water levels	Change in groundwater elevations would be negligible
Impacts to groundwater quality from increased reservoir water levels	Effects would be minor in the short term and negligible in the long term
Short-term impacts to reservoir and downstream water quality from construction	Turbidity would increase during construction; effects minor to moderate

Impact Topic	Construction Alternatives
Hydrology continued	
Impacts from project-related reductions in Tongue River inflows to the Yellowstone River and the resultant increase in arsenic concentrations	Tongue River contributes only 3 percent of flows to the Yellowstone River at Miles City; TDS in Tongue River inflows into Yellowstone average about 490 mg/l; arsenic in Yellowstone would increase to 11 ug/l (state standard = 18 ug/l); effects negligible in the short and long terms
Downstream impacts of the 100-year flood	Flood peaks would increase from 10,249 to 18,928 cfs for Labyrinth Weir, 11,135 cfs for RCC; effects moderate to major and significant in the short and long terms
Long term loss of reservoir storage due to sedimentation	Natural sedimentation would not increase; effects minor in the long term
Wetlands	
Impacts on wetland acreage from increased inundation	314 acres inundated; effects negligible in the long term because of mitigation and natural regeneration
Aquatics/Fisheries	
Impacts of construction-related drawdown and reduced pool capacity on reservoir fisheries	Fish concentrated; higher predation; greater mortality from outlet works; turbidity and sedimentation; effects minor to moderate in the short term and negligible to minor in the long term
Short-term impacts of reduced downstream releases on river aquatic life during construction	Possible lower flows would cause minor effects in the lower reach of the river and minor to moderate effects immediately below the dam
Long-term impacts of postconstruction reservoir operations on reservoir and downstream aquatic life	Increased reservoir volume and downstream river stability would be beneficial to fisheries; effects minor to moderate and beneficial in the long term
Wildlife	
Impacts on terrestrial species from increased reservoir water levels	227 acres of riparian habitat would be flooded (some acres lost permanently); 139 acres of grassland permanently lost; 25 acres of scrub forest permanently lost; effects moderate to major and significant in the short term and minor in the long term
Impacts on waterfowl from increased reservoir water levels	Drawdown would decrease waterfowl habitat in the short term; effects would be minor in the short term and negligible in the long term
Impacts on threatened and endangered species	The bald eagle, peregrine falcon, piping plover, least tern, pallid sturgeon, and black-footed ferret would not be affected by construction or increased reservoir water levels.
Vegetation	
Impacts on vegetation from increased reservoir water levels	Wave action and water saturated soils due to higher water levels would decrease upland species bordering the reservoir; effects moderate in the short and long terms
Impacts on vegetation from project-related road construction	33 acres of native vegetation would be lost to 3 miles of roads; effects minor in the short and long terms because of weed control plan implementation
Impacts on vegetation from state park relocation	23 acres of native vegetation would be impacted; effects minor in the short and long terms

TABLE S-2 *continued*: **Summary of Impacts by Construction Alternative and Resource**[1]

Impact Topic	Construction Alternatives
***Vegetation** continued*	
Impacts on vegetation at the construction staging area	36 acres of native vegetation would be lost; effects major in the short term and minor in the long term because of weed control plan implementation
Impacts on ethnobotanical resources from project activities	None of the 62 plants inventoried are rare or uncommon; effects negligible in the short and long terms
Impacts on downstream and aggregate source Site Nos. 1 and 2 vegetation associated with project construction and operation	60 acres of native vegetation at Site 1 and 10 acres at Site 2 would be lost; effects minor in the short and long terms
Biodiversity	
Impacts of construction on biological diversity from habitat alteration	Effects minor in the short term and minor to moderate and beneficial in the long term
Social Conditions	
Impacts on social conditions from project construction and operation	2 percent employment increase for about 1.5 years would occur for the Tribe; minor beneficial effect in the short term and negligible in the long term
Economic Conditions	
Impacts on employment and personal income from project construction and operation	Wages and salaries for construction would total $1.7 - 1.9 million; effects minor to moderate and beneficial in the short term and minor in the long term
Impacts on the agricultural economy from project construction and operation	About 4,000 acres of irrigated croplands could be affected by decreased water availability during construction; less than 0.1% of agricultural land in county impacted; effects minor in the short and long terms
Impacts on area coal mining from project construction and operation	Increased water levels would result in more seepage into coal mine pits; effects negligible in the short and long terms
Impacts on public sector fiscal conditions from project construction and operation	Minor in the short term on local government. Significant in the short term on state and federal governments, and potentially significant and beneficial in the long term
Transportation	
Impacts on local roads from project construction and operation	Peak traffic period would occur for 6 weeks in mid-late summer, 1997; effects moderate in the short term and negligible in the long term
Impacts on secondary highways from project construction and operation	Peak traffic same as above; adequate highway capacity could accommodate peak without adversely affecting present service or unduly wearing surface; effects minor in the short term and negligible in the long term
Impacts on off-road travel from project construction and operation	Negligible to minor in the short and long terms
Impacts to railroads from project construction and operation	16-22 car-loads/day of materials would be delivered during construction, about 3 percent of present traffic in area; effects moderate in the short term and negligible in the long term

Impact Topic	Construction Alternatives
Recreation	
Impacts to state park access from project construction and operation	About 71,000 visitor-hours lost to access restrictions because of mining at Aggregate Site No. 1 and other project construction activities; effects moderate to major in the short term and negligible in the long term
Long-term impacts to state park recreation opportunity from project activities	Net loss of 26 acres available for camping; effects negligible to minor and beneficial in the long term
Impacts to downstream floating and fishing from project construction and operation	Negligible to minor in the short and long terms
Impacts to recreation experience from project construction and operation	Moderate to major in the short term and negligible to minor in the long term
Short-term impacts to boating opportunities and navigational safety from construction drawdown	About 35,000 boating-hours would be lost during construction; effects moderate in the short term and minor to moderate in the long term
Land Use and Ownership	
Impacts to land use and ownership from project construction and operation	Between 1,000-4,600 acres of private lands would need to be acquired for operations and mitigation (some acreage in easement); effects minor in the short and long terms
Cultural Resources	
Impacts on cultural resources from project construction and operation	8 Euro-American sites and 10 Native American sites affected by higher reservoir water levels and construction; effects moderate in the short and long terms
Noise	
Impacts on road and highway noise levels from construction activity	Levels range from 51-67 dBA; effects minor in the short term
Impacts on the noise levels in the construction staging area from construction activity	Levels range from 75-95 dBA; effects minor in the short term
Impacts to Tongue River State Park noise levels from construction activity	At 200 feet from the roadway, existing levels would increase by 10 dBA or more; effects minor in the short term
If a rail load-out at Sheridan were used, impacts on a three-to-four block area from construction	Levels would increase by 7 dBA to 62-67 dBA; effects moderate in the short term and negligible in the long term
Impacts on Decker, Montana	Minor in the short term and negligible in the long term
Visual Resources	
Impact on visual resources from project construction and operation	Moderate in the short term and negligible in the long term
Impacts to appearance of the spillway	Moderate in the short term and negligible in the long term

Note: [1] Qualitative terms are used to describe anticipated magnitude of impacts and, where appropriate, anticipated importance of impacts to the human environment. The terms "major", "moderate", "minor", and "negligible" describe magnitude. "Significant", "potential to become significant", and "insignificant" describe importance. Impacts are assumed to be insignificant unless otherwise identified.

Except in the case of dam failure, the selection of Alternative 3 (no action) would result in negligible impacts for all topics and resource areas. Under Alternative 3, the dam would continue to have an unacceptable risk of failure. Dam failure would result in moderate to major and significant impacts to hydrology, social and economic conditions, and recreation. Dam failure would pose a threat to human life and property. Economic losses from dam failure are estimated at $300 to $500 million and the resulting damage to fish and wildlife habitat could take up to 40 years to recover fully.

This EIS also analyzes the probable cumulative impacts that would occur from the proposed alternatives in combination with other projects and activities proposed for the area in the reasonably foreseeable future. The other proposed projects and activities included in the cumulative impacts analysis were: the Tongue River Railroad Project, state highway improvements, Twin Lakes Dam Project, Tie Hack Dam Project, Dry Fork Energy Storage Project, and Tongue River State Park improvements.

PREFACE

The purpose of an environmental impact statement (EIS) is to provide the information, background, and facts necessary for individuals/agencies to make informed decisions regarding a proposed project (in this case the Tongue River Basin Project). The following paragraphs outline information contained in the chapters and appendices of the document.

The ***Summary*** is a short, simple discussion to provide the reader and the decision makers with a sketch of the more important aspects of the EIS. The reader can obtain additional, more detailed information from the text of the EIS.

Chapter 1 is the first section of the EIS. It introduces the reader to the project, the agencies involved, and the underlying purpose of, and need for the project and the EIS.

Chapter 2 identifies the significant issues associated with the project, the pertinent components of alternatives analyzed in **Chapter 4**, and presents mitigation. All other alternatives, considered but not analyzed, are identified along with the rationale for not including them in the analysis. A presentation of other reasonably foreseeable projects that may have impacts in combination with the Tongue River Basin Project is made in this chapter. **Chapter 2** also provides a comparative summary of the environmental impacts of the primary alternatives to provide a clear basis of choice among options for the decision maker and the public.

Chapter 3 describes the current condition of resources that are expected to be affected by the alternatives under analysis in **Chapter 4**.

Chapter 4 contains the discussion of expected impacts to the human and physical environment, both with and without the project.

Chapter 5 lists the agencies and others consulted during the preparation of the EIS and describes opportunities made available for public participation.

Chapter 6 lists interdisciplinary team members responsible for preparation and review of the EIS.

Chapter 7 is a glossary of technical or unusual terms used in the EIS.

Chapter 8 lists references cited in the EIS.

Chapter 9 contains all comments from other agencies and the public (both written and from a series of public hearings) on the draft EIS, along with the project sponsors' responses to those comments.

Appendix A provides a list of environmental laws and regulatory authorities applicable to the Tongue River Basin Project.

Appendix B is the biological assessment of threatened and endangered species, as well as species proposed for listing as threatened or endangered (candidate species), of plants and animals that may occur on or near the project area.

Appendix C provides the project sponsors' proposed plan for the enhancement of fish and wildlife habitat in the Tongue River Basin.

Appendix D lists the Montana and federal ambient air quality standards applicable to the Tongue River Basin Project.

Appendix E provides an overview of the Tongue River Water Model used during negotiation of the Northern Cheyenne-Montana Water Rights Compact and during preparation of this EIS. Appendix E also explains the hydrologic data for the Tongue River Basin Project.

Appendix F lists the mammals, amphibians, reptiles, fish, and birds species observed in the Tongue River Dam Area.

Appendix G contains the project sponsors' list of environmental commitments.

Appendix H explains technical difficulties associated with a phased construction approach to remedying the dam safety deficiencies at Tongue River Dam.

Appendix I contains the project sponsors' preliminary Clean Water Act Section 404(b)(1) Guideline Evaluation of the proposed project.

CHAPTER 1

PURPOSE AND NEED

1.1
INTRODUCTION

The Montana Department of Natural Resources and Conservation (DNRC), the Northern Cheyenne Tribe (Tribe), and the United States Bureau of Reclamation (USBR), the project sponsors, have prepared this environmental impact statement (EIS), as required under the National Environmental Policy Act (NEPA) and the Montana Environmental Policy Act (MEPA), to evaluate the environmental effects of the proposed Tongue River Basin Project in southeastern Montana. This project, which includes the repair and enlargement of the Tongue River Dam and the partial fulfillment of the Northern Cheyenne Indian Reserved Water Rights Settlement Act of 1992 (Settlement Act), is being proposed to alleviate dam safety concerns and protect downstream lives and property, to protect all existing water use contracts held in the Tongue River Reservoir, and to provide up to an additional 20,000 acre-feet per year (afy) of water to the Tribe. An additional component of the project involves the conservation, development, and enhancement of fish and wildlife resources and habitat in the Tongue River Basin. All project goals are components of the Settlement Act that ratified the Northern Cheyenne-Montana Water Rights Compact (Compact) entered into June 11, 1991, by the Tribe and the State of Montana.

The draft EIS was released for review June 5, 1995. Comments from other agencies and the public (both written and from a series of public meetings--**see Table 1.1**) have been incorporated into this final EIS. The final EIS provides responses to comments received on the draft EIS, updates project design details, and refines environmental analyses contained in the draft EIS. Most notable project updates involve the inclusion of an auxiliary low-level outlet works under the Roller Compacted Concrete (RCC) alternative, movement of Aggregate Site No. 1 from Sand Point to Campers Point (**see Figure 2-4**), provision of limited access to recreational cabins during construction, and revisions to the plan for upgrading and relocating portions of Big Horn County Road No. 380 as part of project-related construction. Additional analysis of environmental impacts to wetlands in the project area, of impacts related to the development of the Tribe's Compact water, and impacts from construction activities within Tongue River State Park also are included in the final EIS. In addition, consideration was given to several new alternatives (**see Section 2.4**), but these were dropped from further consideration because they failed to meet the terms of the Compact, were infeasible, or cost prohibitive.

Following circulation of the final EIS, the project sponsors will sign a Record of Decision (ROD) identifying the final course of action. The signed ROD will follow no sooner than 30 days after publication of the final EIS.

TABLE 1-1: Number of people attending hearings on the draft EIS

Date	Hearing Location	Number of People Attending
July 17, 1995	Busby, Montana	2
July 17, 1995	Lame Deer, Montana	0
July 18, 1995	Muddy District, Montana	0
July 18, 1995	Ashland, Montana	8
July 19, 1995	Birney Village, Montana	9
July 19, 1995	Sheridan, Wyoming	23
July 20, 1995	Miles City, Montana	12
July 21, 1995	Billings, Montana	7

1.2
PURPOSE AND NEED

Although federal (USBR) and state (DNRC) concerns about the Tongue River Basin Project are basically the same--satisfaction of Tribal water rights and dam safety--each agency has different legal obligations to satisfy. The federal purpose of the Tongue River Basin Project is to protect the following Indian Trust Assets (legal interests in property and rights held in trust by the United States for Indian tribes or individuals):

- The Northern Cheyenne Tribe's existing water supplies held in the Tongue River Reservoir.

- The safety of Tribal members living downstream and their lands.

- Additional Compact water for the Tribe from the Tongue River Basin.

USBR has identified the protection of trust assets of the Tribe as the federal action requiring NEPA compliance for the Tongue River Basin Project. A further purpose of the project as required by legislation is to provide for the conservation, development, and enhancement of fish and wildlife resources and habitat in the Tongue River Basin. Project-related enhancement activities, although required by the Settlement Act, can be considered a secondary project goal and one that is not necessarily related to the actions addressed in this EIS. This stems from the fact that enhancement activities will not involve the increased reservoir storage water related to rehabilitating the dam and increasing its spillway crest elevation. Environmental compliance related to enhancement activities will be conducted when specific projects are proposed.

From the federal government's perspective, the need for the Tongue River Basin Project is as follows:

- The Tribe has an existing 7,500 afy storage right in Tongue River Reservoir, which would be lost with failure of the dam.

- Failure of the dam would endanger the lives of Tribal members and their property. Tongue River Dam has been classified as unsafe by the U.S. Army Corps of Engineers (COE) due to inadequate spillway capacity and high hazard because of the potential for loss of life should the dam fail.

- Without increased storage capacity in Tongue River Reservoir, the State would be unable to provide up to 20,000 afy allocated to the Tribe under the Compact. Other sources of water would be insufficient to meet the needs.

Legislation did not identify specific fish and wildlife habitat enhancement needs; as these needs are identified, funds will be provided for specific projects.

The purpose for the State of Montana's action to be addressed under MEPA is:

- To maintain the ability to deliver all existing water use contracts held in the Tongue River Reservoir.

- To provide a safe dam to protect lives and property downstream.

- To provide increased reservoir storage that, in combination with exchange water (**see Glossary**) and existing unallocated reservoir storage, would allow for the delivery of up to an additional 20,000 afy of water to the Tribe.

The state believes the action is necessary because:

- The Tongue River Water Users Association has 32,500 afy of stored water rights in Tongue River Reservoir and the Tribe has 7,500 afy of existing stored water rights. With failure of the dam, these rights (totaling 40,000 afy) would be lost.

- The Tongue River Dam has been classified as unsafe due to inadequate spillway capacity and high hazard because of the potential for loss of life should the dam fail. Rehabilitation of the dam is necessary to protect all downstream lives and property.

- The Northern Cheyenne-Montana Water Rights Compact requires Montana to deliver up to 20,000 afy of storage and exchange water to the Tribe over and above the Tribe's existing water purchase contract for 7,500 afy.

1.3 LOCATION

Tongue River Dam and Reservoir are located in Big Horn County in southeastern Montana, about 5 miles from the Montana/Wyoming border (**see Figure 1-1**). The nearest towns are Ashland, Montana and Sheridan, Wyoming, 60 and 30 miles away, respectively.

The Tongue River flows about 100 miles from its headwaters in Wyoming's Bighorn Mountains to the project area. The area is located in the Tongue River Valley, formed when the river and its tributaries eroded through parts of the Fort Union Formation. Area topography ranges from the flat river valley and benches to surrounding steep and eroded terrain.

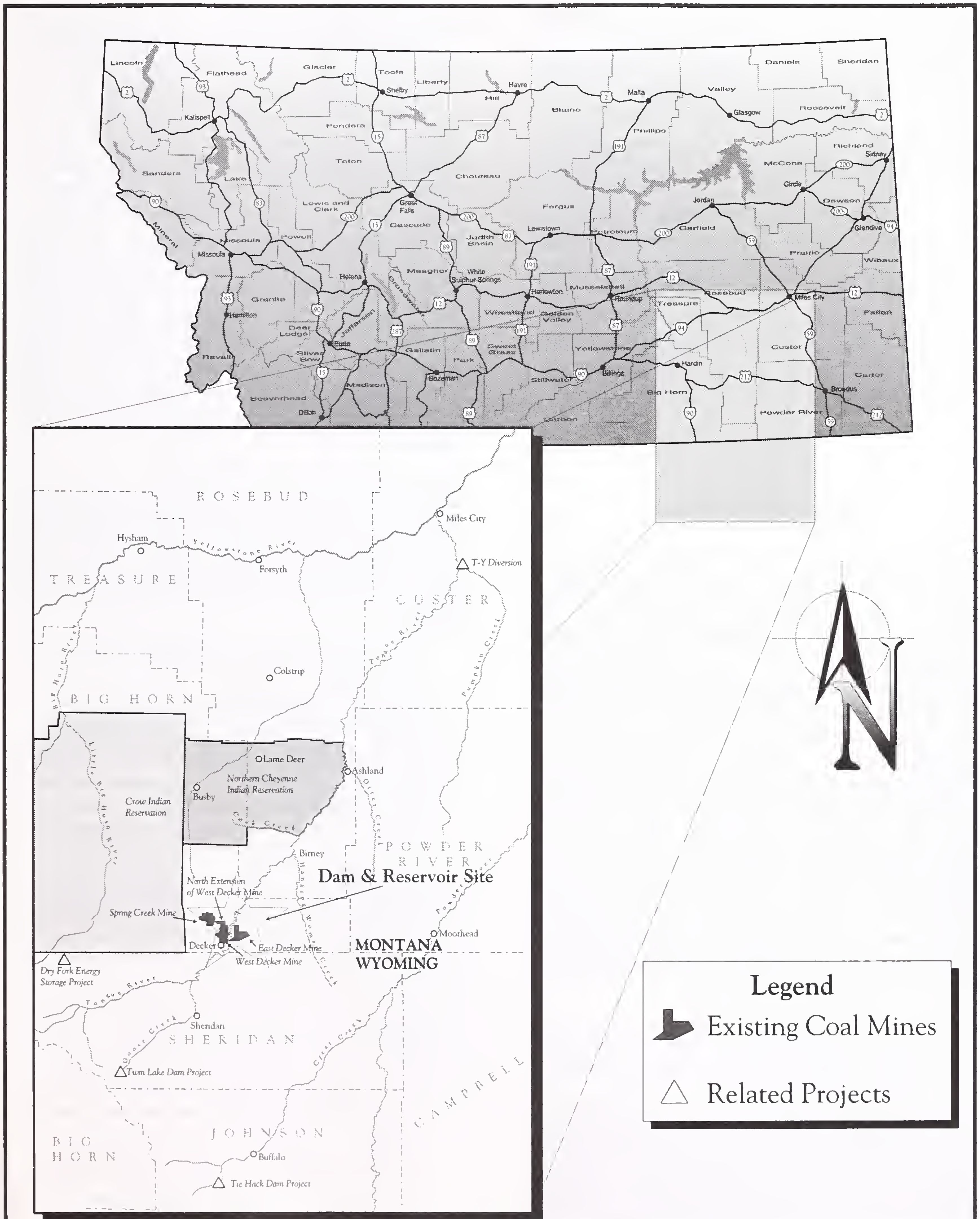


Figure 1-1. General Vicinity Map

The reservoir is about 8 miles long and 1 mile wide with an average depth of 20 feet. From the reservoir, the river flows northeast about 190 miles to its mouth on the Yellowstone River at Miles City. The dam was completed in 1940 and was administered by the Montana Water Conservation Board until 1972 when that responsibility was passed on to DNRC.

The southern boundary of the Northern Cheyenne Reservation lies about 15 miles north of the dam. The Northern Cheyenne Indian Reservation encompasses 466,469 acres located in southeastern Montana. The reservation was created through executive orders in 1884 and 1900. Tongue River and Rosebud Creek are the principal drainages on the reservation.

1.4 BACKGROUND

In 1913, the state court of Montana initiated a proceeding to adjudicate water rights on Tongue River. In this proceeding, the federal government did not fully satisfy the Northern Cheyenne Tribe's Winters rights claims[1] to water in the Tongue River. Instead, the United States asserted a claim on behalf of the Tribe only for the amount of water used by the Tribe at that time. In the Miles City Decree of 1914 (the Decree), the Tribe was awarded only 30 cubic feet per second (cfs) of water out of an available 425 cfs. The Decree established a priority date of 1909 for the Northern Cheyenne water claim; the next to last priority awarded in the Decree. The Tribe's water right as set forth in the Decree was insufficient to irrigate the Tribe's agricultural lands at the time and the late priority date established a high probability that the Tribe would be out of water before the irrigation season began.

The Tribe has asserted that the failure to pursue the Tribe's Winters rights claims constituted a breach of the federal trust responsibility. In 1975, the Tribe filed an action in U.S. District Court to determine its water rights. The United States also filed suit on behalf of the Tribe. In 1979, the State of Montana initiated proceedings for a general stream adjudication which included the claims of the Tribe. In that same year, the state established the Montana Reserved Water Rights Compact Commission to negotiate a water rights settlement with the Indian tribes of Montana. Negotiations with the Tribe began in 1980. Several years of negotiations yielded the Northern Cheyenne-Montana Water Rights Compact (the Compact). The Tribe formally approved the Compact on May 20, 1991, with Tribal Resolution #144. The Compact was ratified by the Montana State Legislature on June 11, 1991, and was re-ratified on December 16, 1993 by the 53rd Legislature Special Session.

On September 30, 1992, the federal government ratified the Compact via "The Northern Cheyenne Indian Reserved Water Rights Settlement Act of 1992" (P.L. 102-374, 106 Stat. 1186) (Settlement Act). The purposes listed in the Settlement Act are as follows:

> *"To achieve a fair, equitable, and final settlement of all claims to Federal reserved water rights in the State of Montana of the Northern Cheyenne Tribe and its members and allotees and the United States on behalf of the Northern Cheyenne Tribe and its members and allotees. To approve, ratify and confirm the Water Rights Compact entered into by the Northern Cheyenne Tribe and the State of Montana on June 11, 1991. To direct the Secretary of the Interior to enter into a cooperative agreement with the State of Montana for the planning, environmental compliance, design, and construction of the Tongue River Dam Project (P.L. 102-374, 106 Stat. 1186, Section.3(8) in order to: implement the Compact's settlement of the Tribe's reserved water rights claims in the Tongue River Basin; protect existing Tribal contract water rights in the Tongue River Basin; provide [up to as per the Compact] 20,000 acre-feet per year of additional storage water for allocation to the Tribe; and allow the State to implement its responsibilities to correct identified Tongue River Dam safety inadequacies. To provide for the conservation and development of fish and wildlife resources*

[1] In *Winters v. United States*, 207 U.S. 564, 577 (1908) the Supreme Court held that when the federal government set aside lands for a particular purpose, it also reserved, by implication, enough of the then unappropriated water on or adjacent to that land to satisfy the purposes of the reservation. In Arizona v. California, 373, U.S. 546, 600 (1963) the Court established the general rule that a Winters right for an Indian reservation is to be determined by reference to the "practically irrigable acreage" on the reservation.

in the Tongue River Basin. To provide for the enhancement of fish and wildlife habitat in the Tongue River Basin. To authorize certain modifications to the purposes and operation of the Big Horn Reservoir in order to implement the Compact's settlement of the Tribe's reserved water rights claims. To authorize the Secretary of the Interior to take such other actions as are necessary to implement the Compact."

The USBR was directed to assume lead federal agency responsibility for environmental compliance activities on the Tongue River Basin Project and the uses of the Tribe's Big Horn Reservoir water supply. This document focuses on evaluation of the Tongue River Basin Project. Environmental compliance activities for the use of the Tribe's Big Horn Reservoir water have been deferred until the Tribe identifies a use for it. The Settlement Act imposed a 10-year moratorium on the marketing of the Tribal water supply stored in the Big Horn Reservoir, unless the Crow Tribe and the Northern Cheyenne agree otherwise. USBR already has prepared a programmatic EIS regarding the marketing of Big Horn Reservoir water. Future environmental compliance for the Northern Cheyenne Tribe's use of this water likely will tier to that existing EIS.

The Settlement Act allocated $4.6 million for enhancement of fish and wildlife habitat and resources in the Tongue River Basin. The funds are provided pursuant to P.L. 89-72, with a cost-share arrangement of $3.5 million in federal funds and $1.1 million in state funds.

Negotiation of the Compact and signing of the Settlement Act were carried out in advance of NEPA compliance. However, the Settlement Act specifically directed the Secretary of the Interior to comply with NEPA and the Endangered Species Act during implementation. To comply with that directive, it is necessary to evaluate not only the actions contained in the Settlement Act, but all other reasonable alternatives that meet the project purpose and need as intended by the Act.

1.5 APPLICABLE LAWS, REGULATIONS AND AGENCY INVOLVEMENT

Appendix A provides a detailed discussion of environmental laws, regulations, and agency involvement applicable to this project.

CHAPTER 2

ALTERNATIVES

2.1
INTRODUCTION

This chapter contains five parts. ***Development of Alternatives and Significant Issues*** explains how the project sponsors -- Department of Natural Resources and Conservation (DNRC), the Northern Cheyenne Tribe (Tribe), and Bureau of Reclamation (USBR) -- developed alternatives analyzed in this EIS. ***Description of Alternatives*** describes three alternatives, including the no-action alternative. ***Alternatives Considered but Dismissed*** describes alternatives considered but dismissed from detailed analysis in this EIS. ***Reasonably Foreseeable Activities*** discusses the reasonably foreseeable future activities included in the cumulative impact assessment. ***Comparison of Alternatives*** displays the alternatives so that their respective features and impacts can be compared.

Late in the process of developing the draft EIS, the project sponsors identified Alternative 2, the Roller-Compacted Concrete (RCC) Spillway, as the preferred alternative.

2.2
DEVELOPMENT OF ALTERNATIVES, AND SIGNIFICANT ISSUES

Once the project sponsors had identified the purpose and need for the project (**see Chapter 1, *Purpose and Need***) they began a process of developing alternatives. At the outset, alternatives were limited by the multipurpose needs of the project. Alternatives being considered needed not only to address dam safety and repair, but also to satisfy the Tribe's water right, and include fish and wildlife enhancement activities.

In March 1993, the project sponsors held public scoping meetings to aid in alternatives identification. Comments from nine scoping meetings (**see Chapter 5, *Public Involvement***) contributed to the project sponsors' issues identification process. From this, refinement of alternatives and proposed mitigation was made to ensure that public and project sponsor issues were addressed.

USBR and DNRC also began determining the least-cost method of fixing the dam, because only one structural plan -- a labyrinth weir spillway -- was being considered at the time. USBR analyzed different spillway designs. Criteria for the spillway included: raising the spillway crest elevation 4 feet, and passing the spillway design flood (SDF) of 100,000 cubic feet per second (cfs) without overtopping the dam embankment or flooding the coal strip mines at the south end of the reservoir. The RCC alternative emerged from this analysis.

Raising Tongue River Dam spillway crest elevation 4 feet would increase full pool reservoir capacity to about 80,000 acre-feet (af) from the present 67,000 af. The resultant increase in firm annual yield (**see Glossary**) would equal approximately 7,000 acre-feet per year (afy), from the current 47,000 afy to the proposed 54,000 afy. This is the minimum increase in firm annual yield that, in combination with existing unallocated reservoir storage (approximately 7,000 af) and a Tribal credit for agricultural return flows (approximately 5,000 afy), would allow for the delivery to the Tribe of up to 20,000 afy under the Compact. During very dry years, the shared shortage provisions stipulated in the Compact would help offset the inability to deliver the full Tribal Compact right for up to 20,000 afy.

Legislation requires that conservation, development, and enhancement of fish and wildlife resources and habitat in the Tongue River Basin be a project component. Congress saw the need for enhancement in the project area as a general need. Although no specific needs have been defined or proposals forwarded, the general enhancement features listed in **Appendix C** show the project sponsors' commitment to satisfying the intent of Congress. Site-specific environmental compliance will be conducted when actual enhancement projects are evaluated.

The addition of hydropower generation equipment to the Tongue River Dam was investigated by Tudor

Engineering, Inc. (1982) and DNRC (1994). The evaluation concluded that the cost of modifications to the dam and installation of hydropower equipment versus the amount of potential revenue from energy that could be generated would not be cost-effective at today's energy rates.

Alternatives carried forward in this EIS are discussed under ***Description of Alternatives***. The others are discussed under ***Alternatives Considered but Dismissed***. The object was to isolate the most technically sound and cost-effective alternative(s) that satisfied the Settlement Act. The labyrinth weir and RCC designs were retained because of their ability to address all three concerns: cost, technical soundness, and water rights. Although the two construction alternatives achieve the same purposes, construction and design are different for each, and each has slightly different physical effects associated with it.

2.2.1 Identification of Significant Issues

The project sponsors carried out a public involvement plan as discussed in **Chapter 5**. From scoping meetings held in accordance with the plan, the public identified issues and concerns regarding this project.

From issues identified at those meetings and by agency staff, the project sponsors and the interdisciplinary team responsible for preparation of the EIS identified significant issues that would be used to drive the alternatives' formulation (including proposed mitigations). Significant issues define effects that have the potential to be severe or long-lasting; affect a large area; or occur frequently when a resource's quantity, quality, fragility, or uniqueness are considered. Issues under five resource areas emerged from the scoping process and project sponsors' evaluations.

2.2.1.1 Aquatics/Fisheries

Effects on aquatic resources within the reservoir and river upstream and downstream of the reservoir

- Drawdown of reservoir levels during construction could result in large scale mortality of fish in the reservoir. Effects will be predicted from changes in the critical physical and chemical parameters in the aquatic habitat.

- Drawdown of the reservoir could cause the loss of immature and smaller fish due to predation; there would be a higher concentration of fish per volume of water. Drawdown could also limit fish reproduction and survival rates and result in greater losses of fish drawn through the outlet works. Effects will be predicted based on results observed in similar circumstances in the aquatic environment.

- Short-term impacts to aquatic life could occur from reduced flows in the river and related temperature increases during summer and increased turbidity and sedimentation during construction. Reduced flows during winter also could result in anchor-ice (freezing from the streambed up) formation and accompanying scouring of the river bottom in riffle areas during spring thaw. Depending on the extent of occurrence in the river, reduced biological productivity could occur. Effects will be measured by estimating the extent of mortality if flow drops below the average run-of-river flows into the reservoir.

- Long-term (following project construction) effects on aquatic life would occur in the river upstream of the dam due to inundation of about 1 mile of river habitat and its replacement by reservoir conditions. Effects will be predicted based on results observed in similar circumstances in the aquatic environment.

- Wetlands will be flooded because the reservoir pool will increase in size.

2.2.1.2 Hydrology

Effects on the water rights settlement with the Northern Cheyenne Tribe

- Either of the construction alternatives provides the means to satisfy the Tribe's Compact water

[1] *To satisfy the terms of the Northern Cheyenne - State of Montana Water Rights Compact, the rehabilitation and enlargement of the Tongue River Reservoir would allow the Northern Cheyenne Tribe to divert up to 20,000 acre-feet per year (afy) from a combination of water stored in the reservoir and exchange water. A second component of the Compact allows the Tribe to divert up to 12,500 afy from the direct flow of the Tongue River. These rights (storage and exchange water from the enlarged reservoir and direct flows from the river) would be in addition to the existing Tribal water purchase contract for 7,500 afy* ***(see Appendix E)***.

right for up to 20,000 afy[1]. Without the project, DNRC would not be able to satisfy this legal requirement as set forth in the Settlement Act. Sedimentation within the reservoir and its impact on the Tribal water right is addressed in the Compact.

Impacts of Flood Events

- The characteristics of discharges from common flood events could change, affecting downstream channel form. The changes will be measured by estimated differences in the characteristics of peak flood discharges.

- The characteristics of flood discharges from the 100-year flood could change compared to existing conditions. The changes will be measured in terms of estimated flood peak and topwidth, downstream floodplain size, and flood depth.

2.2.1.3 Socioeconomics

Effects on Decker Coal Mines Adjacent to the Reservoir

- Groundwater seepage into coal mine pits could increase after construction due to increased water elevation in the reservoir. This could negatively impact coal recovery and mine operation. The impact will be measured by the increased rate of groundwater seepage into coal mine pits and associated costs.

Effects of dam failure on human safety and property downstream of the project

- Since 1978, DNRC has operated the dam at a reduced level due to concerns about hydraulic and structural adequacy of the spillway (DNRC 1981, 1991). If spillway failure occurred, towns and ranches in the Tongue River Valley would suffer significant damage. There also would be the possibility for loss of life. Fish and wildlife habitat could take from 1 to 10 years to recover and mature vegetation even longer. Economic losses from dam failure are estimated at $300 to $500 million, and reserved water rights could not be met. Recreation use totaling more than 25,000 visitor-days would be lost (Northern Cheyenne Tribe, DNRC, and USBR 1992). Economic losses and human safety risks have already been estimated.

Indian Trust Assets/Federal Trust Asset Responsibility

- The project sponsors' alternative analyses were guided by consideration of whether there was an ability to protect Indian Trust Assets. In this case, those assets included the ability to supply up to 20,000 afy of water storage in addition to the Tribe's existing water supplies, the safety of Tribal members living downstream and their lands, possible effects on ethnobotanical resources, possible effects on wildlife and fisheries, possible effects on cultural resources, and possible beneficial effects on natural systems addressed by enhancement measures.

Impacts to state and federal governments from the cost of construction

- The costs of a number of alternatives were analyzed to minimize the fiscal impact of dam repair on governmental agencies and ultimately, taxpayers. The two construction alternatives appear to be the most cost-effective in achieving the purpose and addressing the need of the project. Costs to state and federal government agencies have already been estimated (Northern Cheyenne Tribe, DNRC, and USBR 1992).

2.2.1.4 Recreation

Short-term effects on recreation resources

- Effects on the fishing access site below the dam, restricted use of state park facilities (especially during aggregate mining at Campers Point), and temporary restrictions of shoreline access for walking and off-road vehicle use in the vicinity of the proposed construction staging area would occur during construction. Effects will be measured by comparing existing access, visitor-hours, and disbursement at the state park to estimated changes in access points, visitor-hours, and disbursement as a result of the project.

- Construction drawdowns would increase boater exposure to navigational hazards (e.g., sandbars, dead trees, debris). In addition, existing docking and launching facilities would be temporarily unusable and ultimately relocated. Effects of navigational hazards will be measured by calculating the period of time that hazards, such as submerged debris and exposed mudflats, would likely be encountered because of fluctuating water levels as a result of the project.

Effects of drawdown on boating opportunities will be measured by comparing existing total boating hours to estimated changes in total boating hours as a result of the project.

- Short-term reduction in the quality of the recreational experience would result from increased noise and dust associated with construction activity, restricted access, and loss of use of facilities during construction. This would be especially true during aggregate mining at Campers Point. Effects will be measured by comparing existing visitor experiences at the state park to estimated changes in recreational experiences.

2.2.1.5 Northern Cheyenne Compact Water Right

Use of Compact Water by the Tribe

- The increased water provided by the project is a result of negotiations between the Tribe and the State of Montana. According to the provisions of the Settlement Act, the Tribe, State of Montana, federal government, U.S. Congress, and President of the United States agreed formally that the tribe is free to use its Compact water for any purpose it chooses. Furthermore, the Tribe is free to change its use of Compact water as it wishes and at any time. The Tribe has identified its present and reasonably foreseeable use of Compact water as fish, wildlife, and recreation purposes in the reservoir and downstream.

2.3 DESCRIPTION OF ALTERNATIVES

This section describes three alternatives: two construction alternatives (the labyrinth weir alternative, Alternative 1, and the RCC alternative, Alternative 2) and the no-action alternative (Alternative 3). The two construction alternatives would rehabilitate or replace the Tongue River Dam spillway and raise its crest 4 feet, increasing its safety and allowing the Northern Cheyenne Tribe's reserved water rights from the Tongue River Basin to be satisfied without impacting other water users. Included in both construction alternatives is an identical program to enhance fish and wildlife habitat in the Tongue River Basin. A description of the process through which enhancement projects are identified, reviewed, and implemented, as well as a list of features currently being considered, is included immediately following the description of Alternative 1. Although the construction alternatives are referred to throughout the document only by their respective construction design, readers should remember that each also includes fish and wildlife resources and habitat enhancement required by the Settlement Act. The no-action alternative would maintain the status quo. Summaries of the construction alternatives were prepared from conceptual design plans on file at DNRC. Although the construction alternatives described in this EIS are distinct and separate, certain components of either could be combined during final design if it is determined that such a combination would result in no change in impacts. If impacts did change, subsequent environmental compliance would be required.

2.3.1 Alternative 1 Labyrinth Weir Spillway

The labyrinth weir spillway design incorporates three conventional components of a spillway: ***the crest***, or top of the spillway; ***the chute***, or channel of the spillway; and **the *stilling basin***, or pool at the bottom. The crest of a labyrinth weir spillway looks like a zigzag when viewed from the top (**see Figure 2-1 and Figure 2-2**). Retaining walls, about 25 feet high, form the accordion-like structure. These walls taper as they rise, from about 5 feet at their base to about 1.5 feet at their top. This crest design is the most efficient in discharging water when compared to other designs of the same width. The crest would be about 250-feet wide (narrower than the existing spillway by 100 feet).

This alternative also would include a new RCC foundation for the spillway and an impervious upstream cutoff wall to prevent seepage beneath the labyrinth weir. The existing foundation would be excavated down to elevation 3,380 feet.

The 500-foot-long chute would be the same width as the crest (250 feet) and would have a smooth face.

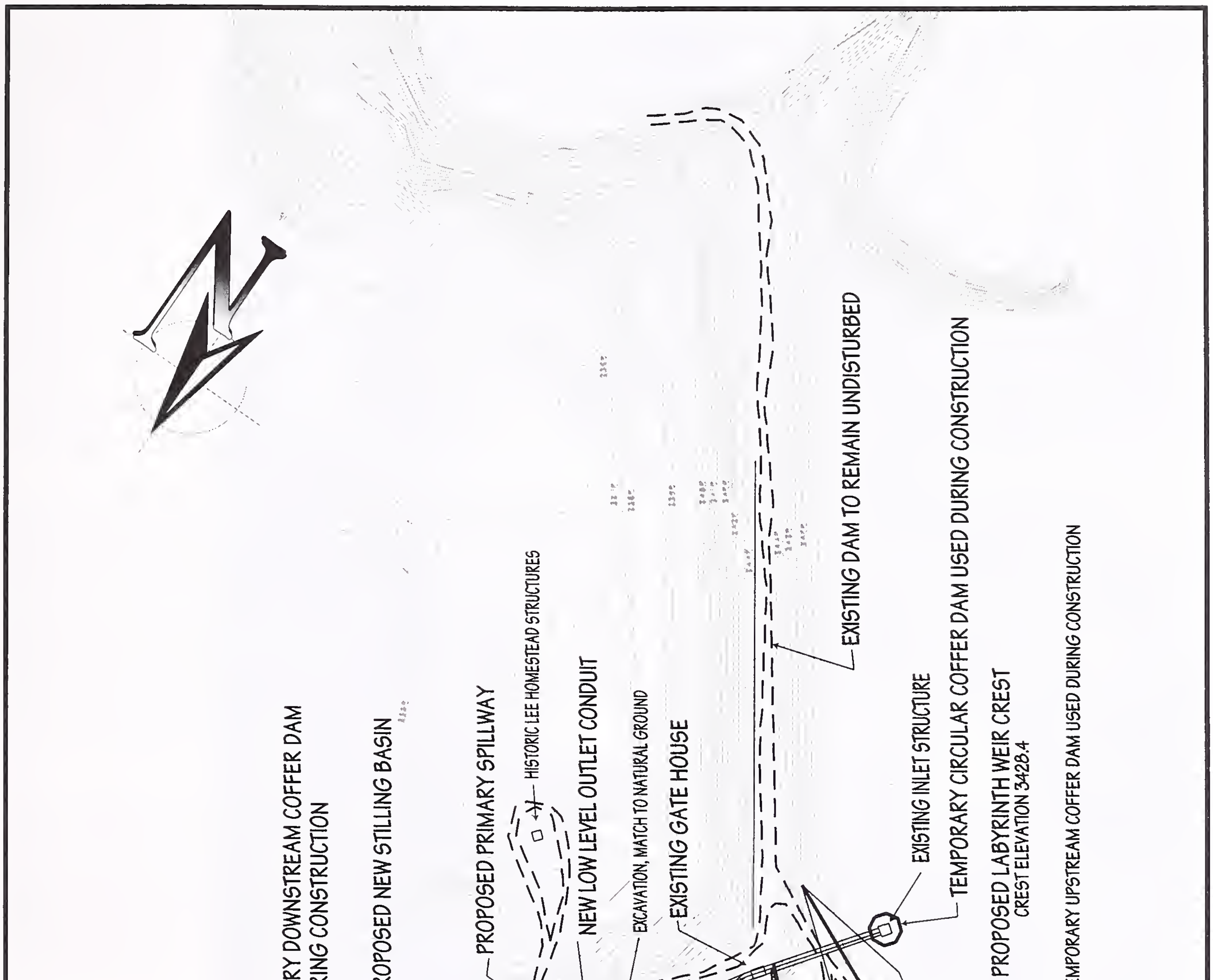
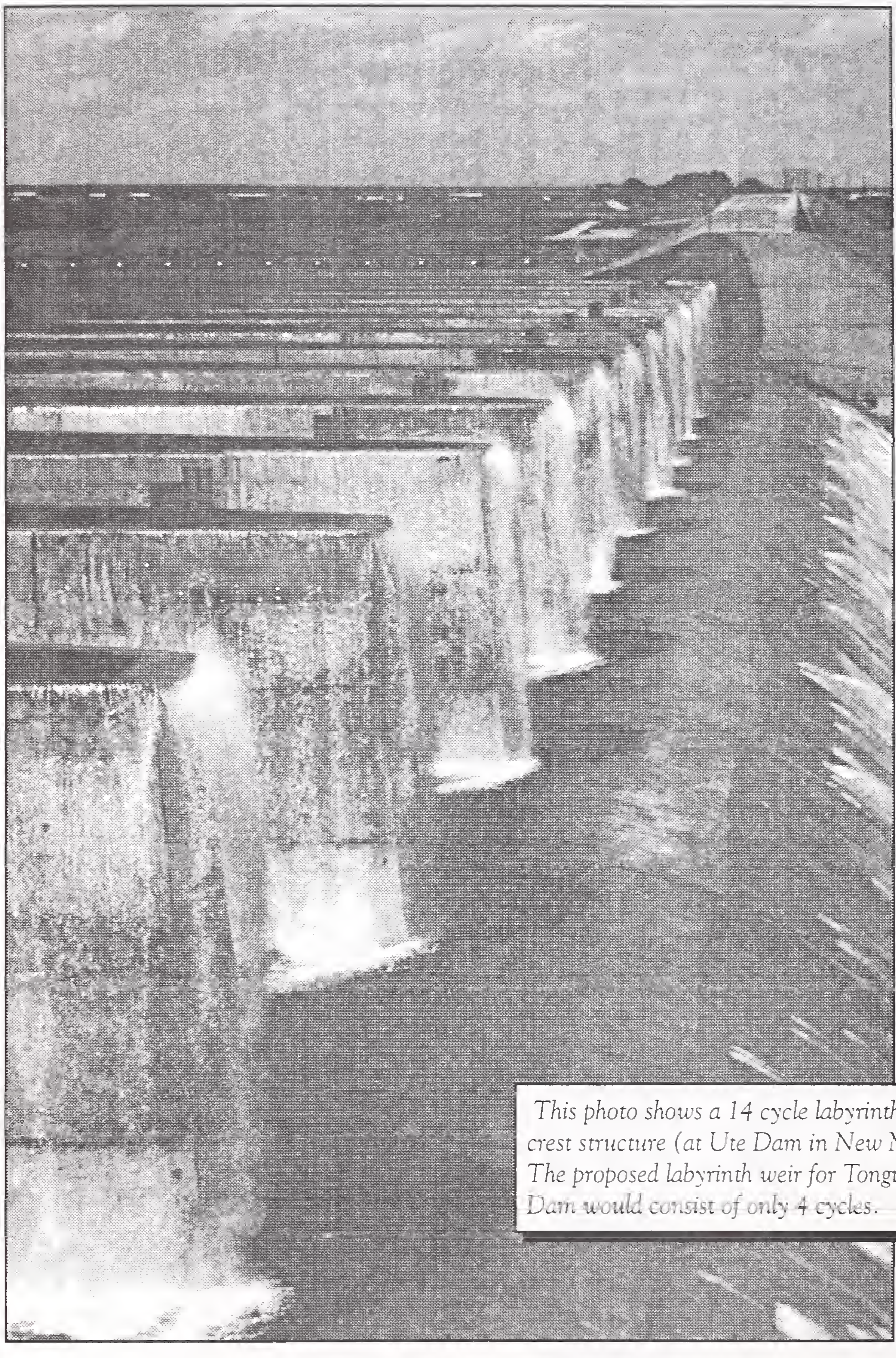


Figure 2-1. Labyrinth Weir Spillway Site Plan



This photo shows a 14 cycle labyrinth weir crest structure (at Ute Dam in New Mexico). The proposed labyrinth weir for Tongue River Dam would consist of only 4 cycles.

Figure 2-2. Photo of an Existing Labyrinth Weir Spillway in New Mexico

Water would flow down the chute to a 150-foot-long stilling basin at the toe of the spillway (**see Figure 2-3**). A stilling basin dissipates the energy of fast-flowing water spilling over the spillway by routing it to a pool of deep, slow-moving water at the toe of the spillway. Dissipating the energy of the fast-moving water prevents erosion of the channel downstream of the spillway. The bottom of the stilling basin would be about 18 feet below the natural stream channel. Construction of the stilling basin may require passage of water from the outlet works through a flume. This flume would bypass the stilling basin and discharge downstream of a temporary coffer dam (**see *Coffer Dams***).

The reservoir level would be raised 4 feet and the spillway design outflow of 100,000 cfs would be routed through the labyrinth spillway in the left abutment. The 4-feet increase in water surface elevation from 3,424.4 to 3,428.4 feet would increase the reservoir capacity from 67,000 af to 80,000 af. The reservoir surface area at the new spillway elevation would increase approximately 400 acres from 3,198 acres to 3,612 acres (**see Figure 2-4**).

DNRC would acquire use of land up to elevation 3,440 feet, either by purchasing fee title to it or by acquiring flood easements. Because of its wildlife and fisheries habitat value, vegetation would not be removed in the land area between the existing water level and proposed reservoir elevation of 3,428.4 feet.

The existing spillway would reduce the 30-day 100-year peak inflow of 25,410 cfs to a discharge of 10,249 cfs to the channel downstream of the project. The average 100-year floodplain width would be about 361 feet and the average depth about 10.4 feet. For comparison purposes only, spillway performance at different flood events is shown on **Figure 2-5**.

Peak outflow from the labyrinth weir spillway during the 30-day 100-year flood would be about 18,928 cfs versus 10,249 cfs for the existing spillway. The average 100-year floodplain width would be about 467 feet compared to the existing average floodplain width of 361 feet. The average 100-year floodplain depth would be 13.5 feet or 3.1 feet higher than the existing condition.

The labyrinth weir concept allows a relatively narrow spillway to discharge the 100,000 cfs design flow at an elevation 4 feet below the top of the dam. The labyrinth weir crest structure would require three to four labyrinth cycles. Each "V" in the accordion crest structure is considered a cycle.

The stilling basin area would have to be dewatered during construction because of groundwater's proximity to the surface. This would be accomplished by temporary pumps and "well points". Well points are a series of interconnected wells that extract groundwater by pumping it up and discharging it, in this case to a settling pond, reservoir, or downstream to augment flows in the river.

2.3.1.1 Rehabilitation of Existing Low Level and Construction of Auxiliary Outlet Works

Low level outlet structures allow water to exit the reservoir without flowing over the spillway, but rather through a conduit (tunnel). Portions of the existing low level outlet structure would be rehabilitated and/or replaced, incorporating the existing intake, upstream tunnel, and new gates into the new structure (**see Figure 2-6**). The downstream conduit of the outlet structure would be realigned to make it parallel the spillway to the right. An auxiliary outlet, separate from the primary outlet, would probably be built to the left of the spillway.

The existing low level outlet works consists of an intake structure in the reservoir with minimum intake elevation of 3,374 feet, a 16-foot-high horseshoe-shaped conduit leading to the gate tower, the gate tower, and a 16-foot horseshoe-shaped conduit leading to the exit portal in the spillway chute (**see Figure 2-6**). The existing outlet structure has a maximum capacity of approximately 4,000 cfs. Most of this structure is in serviceable condition with the exception of the control gates.

The auxiliary outlet works, with gates on the upstream and downstream ends, would be constructed prior to rehabilitation of the primary works. The proposed capacity would be 600 cfs. During construction, a combination of the auxiliary and existing low level outlet works would be used

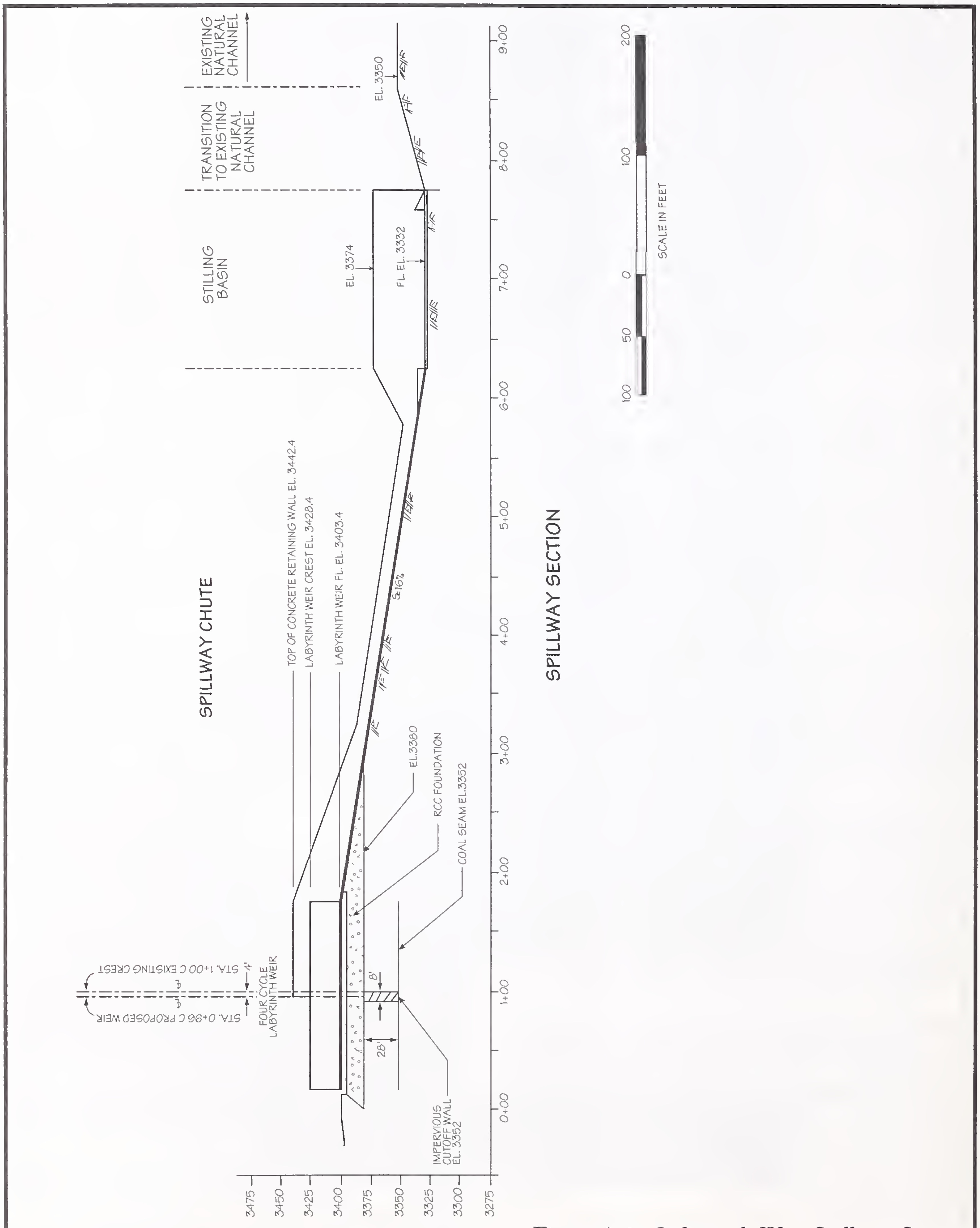


Figure 2-3. Labyrinth Weir Spillway Section

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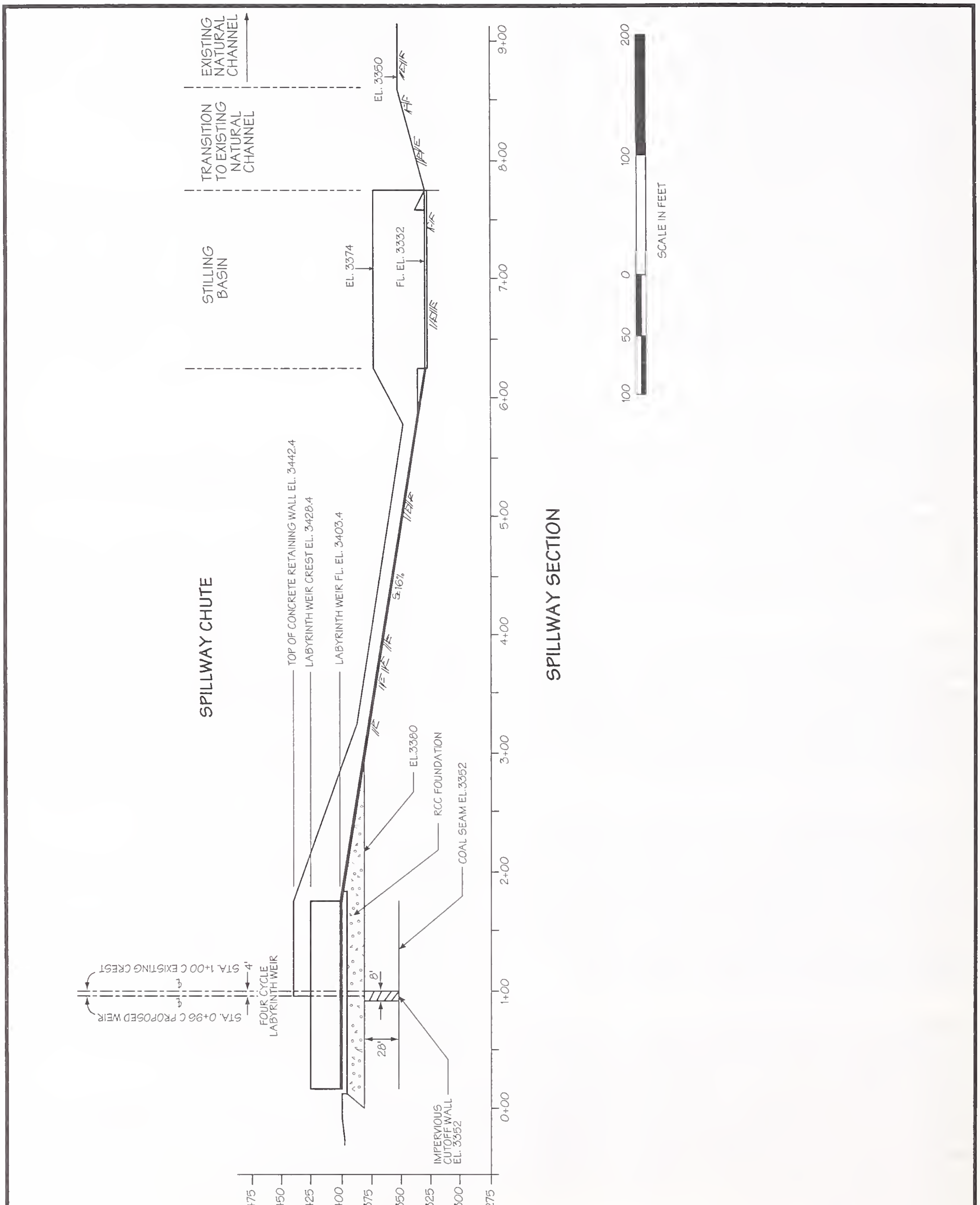


Figure 2-3. Labyrinth Weir Spillway Section

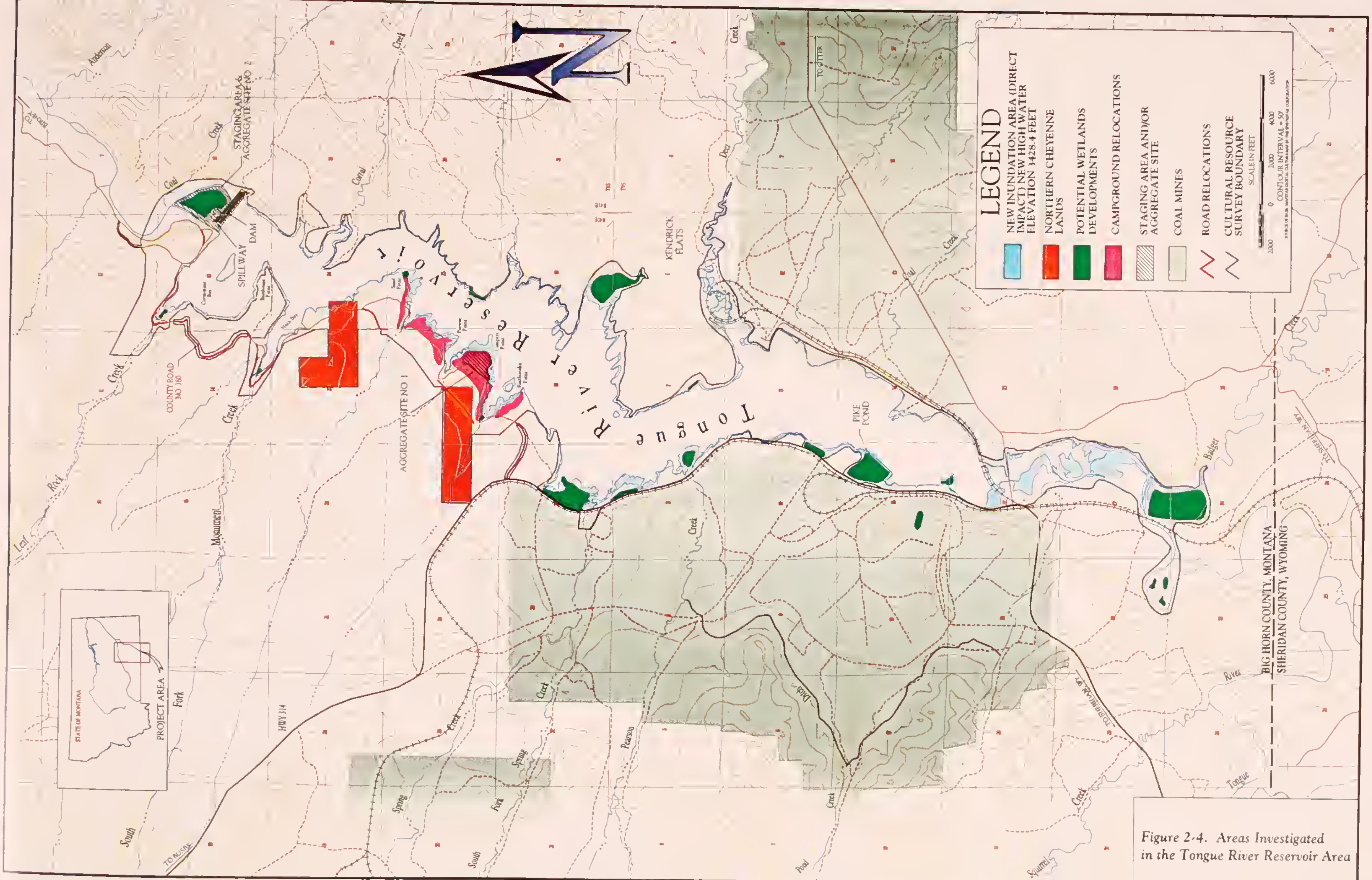


Figure 2-4. Areas Investigated in the Tongue River Reservoir Area

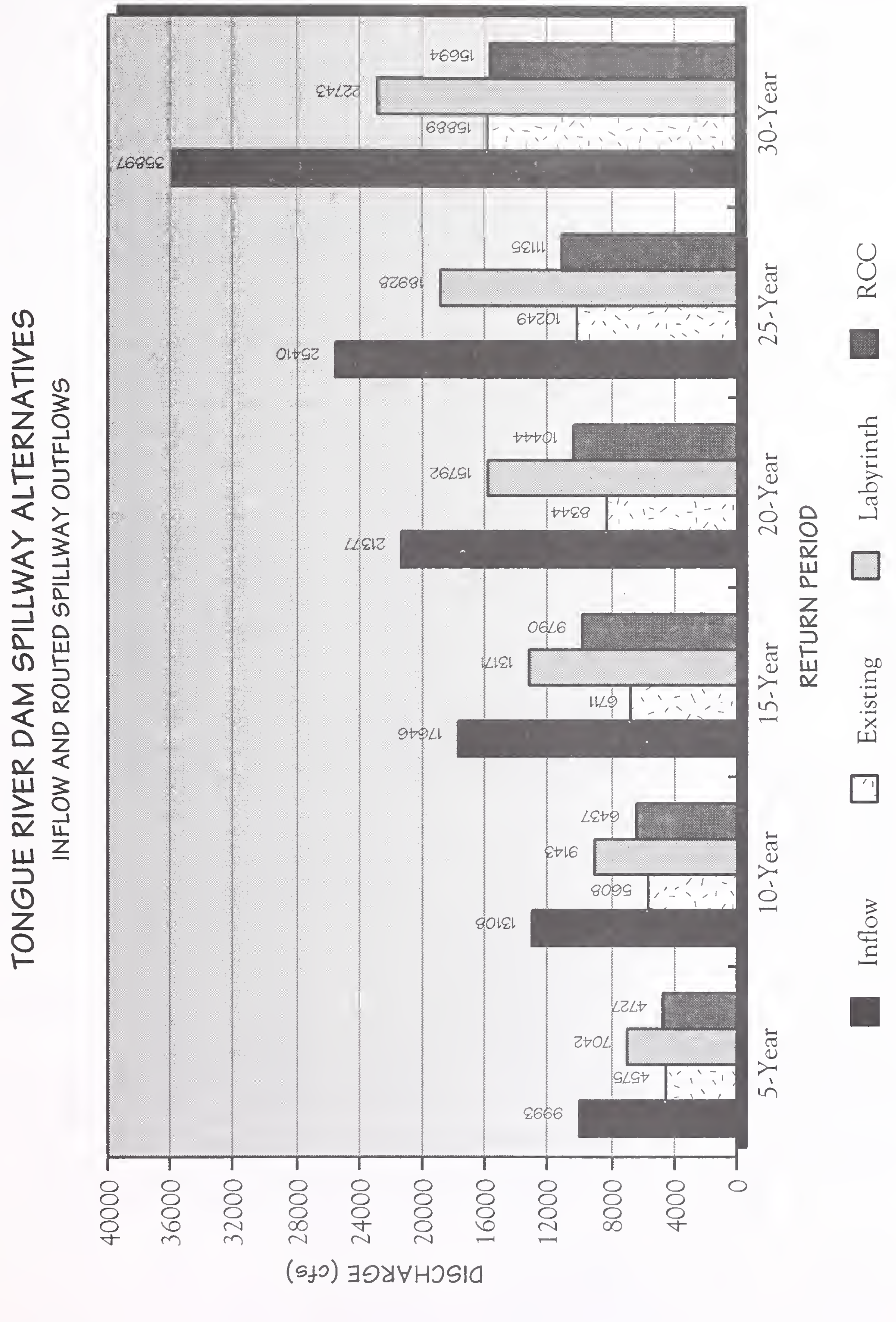


Figure 2-5. Tongue River Dam Spillway Alternatives Inflow And Routed Spillway Outflows

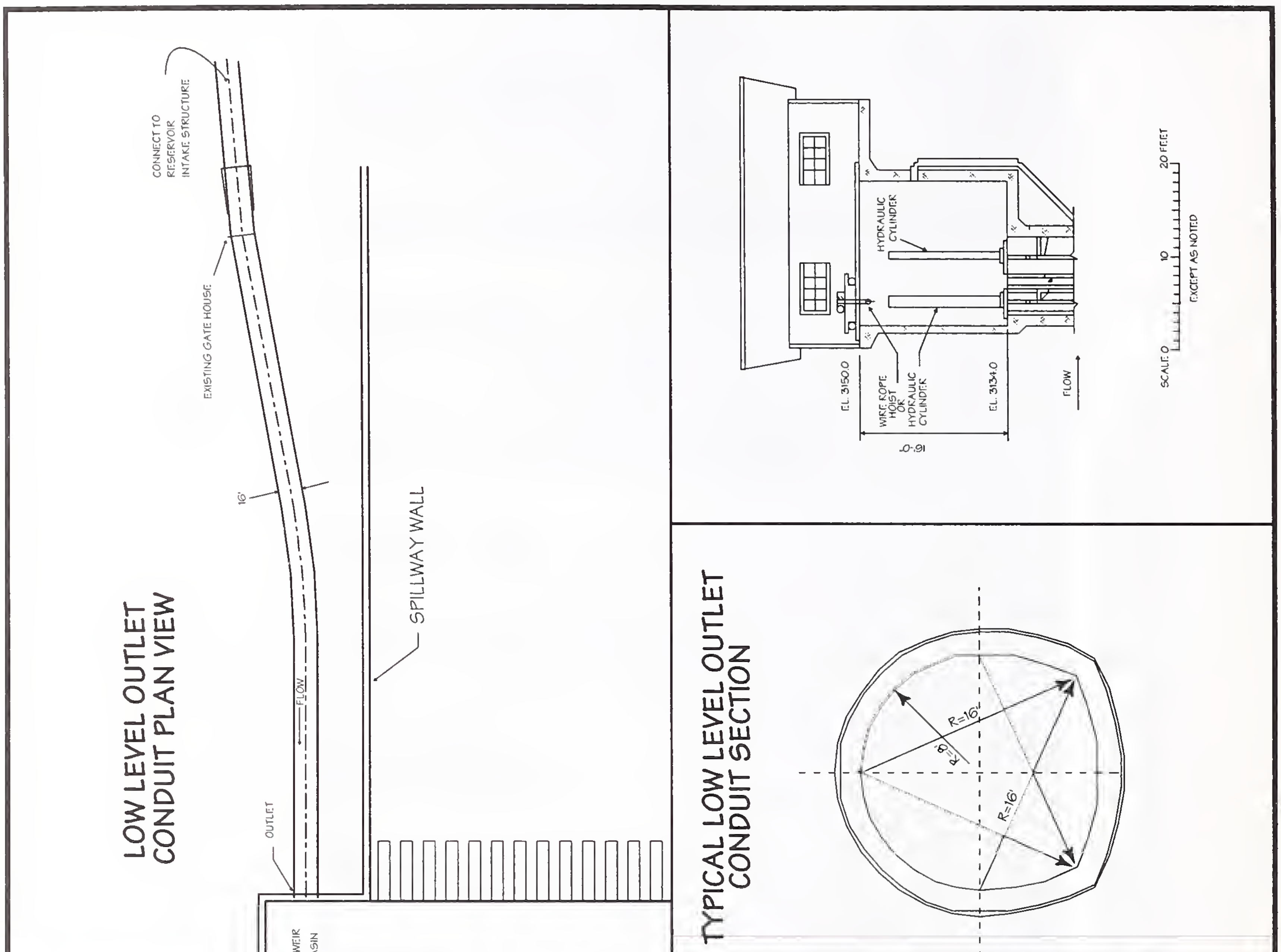


Figure 2-6. Labyrinth Weir Outlet Rehabilitation

to pass river flows around the project, with one being used as the other was being rehabilitated or constructed. Both low level outlet works would remain in place after the project was completed.

A rehabilitated primary low level outlet works would be constructed next. After rehabilitation, the capacity would be about 4,000 cfs, unless restricted by the new gate configuration or the need to line the outlet tunnel. During this stage of construction, temporary stream diversion would take place through the new auxiliary low level outlet works. The new primary outlet would be constructed to the right (east) of the existing spillway and would require the construction of a new downstream conduit connecting to the existing gate tower. The existing 6-foot-wide by 12-foot-high roller gates in the gate tower would be replaced by gates of similar dimensions as shown on **Figure 2-6**. The purpose of the gates is to allow controlled releases from the reservoir. The new primary low level outlet works would have a capacity sufficient to reduce the reservoir from full pool to 25 percent of capacity in 25 days or less (USBR reservoir evacuation standards).

Negative pressures downstream of the primary control gate are now experienced during high flows due to the lack of adequate aeration. This lack of aeration has resulted in erosion of the concrete and steel materials in this area. The proposed improvements would include an air shaft to provide sufficient aeration of this area and other hydraulic improvements to prevent this problem.

2.3.1.2 Coffer Dams

A coffer dam is a temporary dam designed to contain and divert water away from a dam, spillway, or outlet during construction. An upstream coffer dam having a crest elevation of 3,426 feet would be constructed to prevent reservoir water up to a 25-year flood event from entering the spillway construction area. This dam would be 45 to 50 feet high and 8 to 12 feet wide at the crest and about 200 feet wide at the base. Construction of the coffer dam could require placement of fill in the reservoir. It would extend from the left abutment to the existing dam, about 500 to 600 feet long. This temporary dam would be sized to allow the reservoir to store up to 30,000 af of water (45 percent of full pool). A dewatering system would also be required to remove seepage flows from the construction area. A second upstream coffer dam would be required around the inlet of the low level outlet works to allow dewatering of that structure during rehabilitation. This coffer dam could be constructed of earth fill or steel sheet piling, or a combination of both.

A downstream coffer dam would be placed just beyond the proposed stilling basin to allow diversion of streamflows around stilling basin construction. This dam would be relatively small, measuring about 10 feet high and 100 feet long.

2.3.1.3 County Road Improvements

About 7.5 miles of Big Horn County Road No. 380, leading to the dam site from Secondary Highway 314, would be widened, receive gravel surfacing, and portions would be realigned **(see Figure 2-4)**. Improving the county road would require right-of-way easements from as many as six private landowners.

Road improvements would be constructed during the period from late summer through early fall of 1996. During construction, traffic would be restricted, rerouted, and/or delayed during certain periods. Construction activities would require extensive use of this road for crews traveling to and from the site, and for heavy truckloads of materials such as reinforcing steel, cement, and concrete aggregate. The increased reservoir elevation would require realignment and improvements to the county road. Construction methods would include clearing of the new roadway alignment and cut-and-fill construction of the roadway section. A typical roadway cross section is shown in **Figure 2-7**. The county road improvements most likely would be conducted under a separate contract.

Traffic during construction would be safely controlled by flag persons and signs, appropriate to day, night, and climatic conditions. During construction, the contractor would be responsible for dust control using watering trucks and/or calcium chloride, and for periodically grading the road.

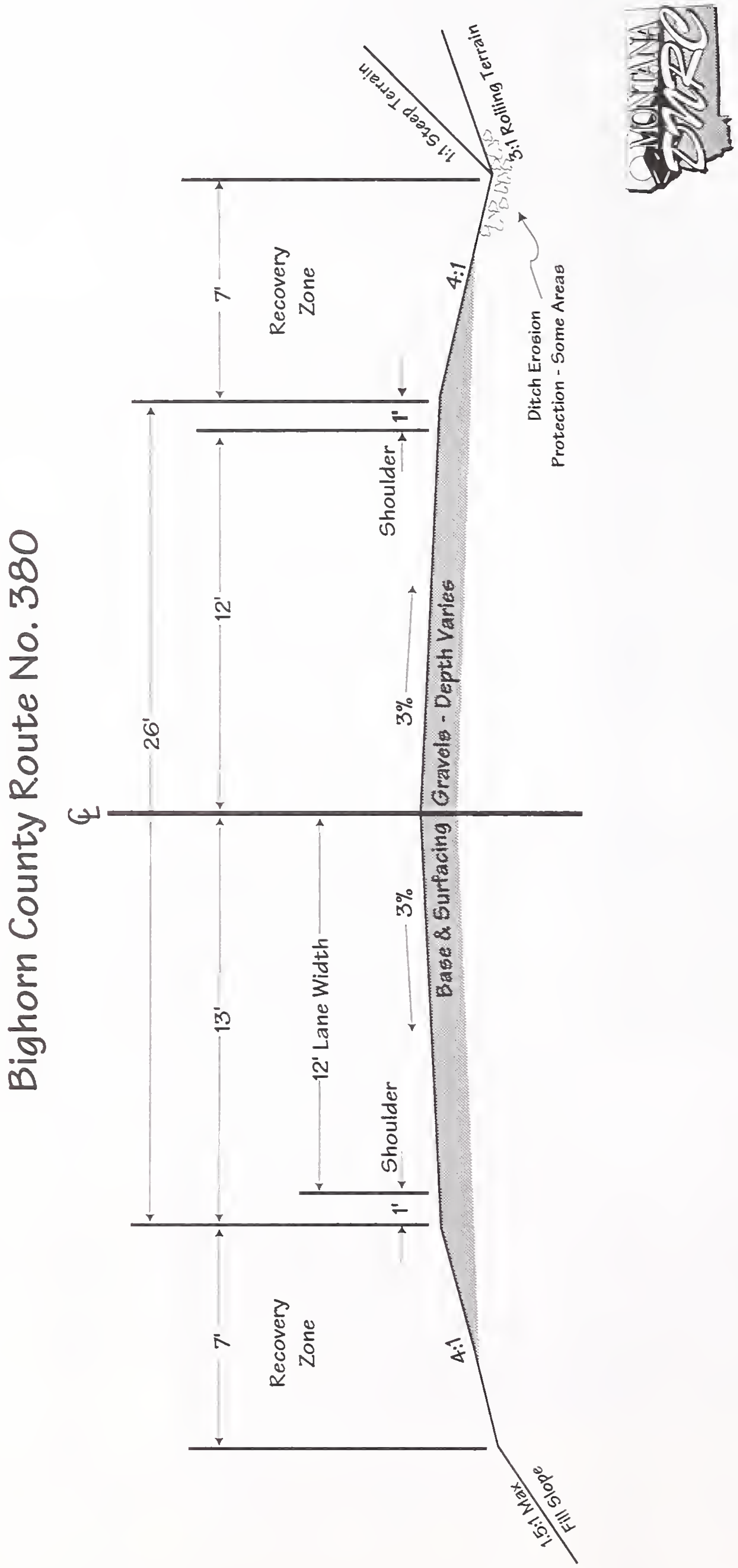


Figure 2-7. Tongue River Basin - Transportation System Analysis Typical Road Section

2.3.1.4 Structure and Shore Erosion Protection

With the 4-foot increase in reservoir elevation, subsequent floods could increase shore erosion along approximately 2.25 miles of Secondary Highway 314 embankment, Decker Coal's embankments and facilities, and bridges and culverts in the upper reservoir area. Protecting these facilities would require the use of dumped riprap or vegetation up to a proposed maximum elevation of 3,432.0 feet.

2.3.1.5 New Bridge Access

A bridge for pedestrians and vehicles would be provided for access to the gate house during flood events and for public access to lands on the east side of the dam after construction (**see Figure 2-8**). Final design would determine the specifications of both the bridge and the road leading to and from it.

2.3.1.6 Construction Staging Area

The construction staging area may impact up to 36 acres as shown on **Figure 2-8**. It would be designed by DNRC and the construction contractor in detail after final design since the precise size and location of buildings, trailers, batch plants, mills, and other temporary facilities will not be known until an alternative is selected and a construction contractor hired. Site plans would emphasize ease of ingress and egress.

The construction staging area would include both the stream valley immediately below the dam and the Tongue River Canyon Fishing Access Site, located immediately downstream of the dam on the west side of the river. It would also include the waste area from original dam construction and add considerably to its current size. During construction, the fishing access site would be closed.

The fishing access site would provide parking for construction personnel. Access for private cabin owners on the east side of the reservoir who normally use the dam crest would be provided during construction at selected intervals. The construction contractor would assist in determining those intervals.

Fueling and maintenance facilities would be located on a bench to provide sufficient separation between fuel tanks and groundwater to meet applicable regulations. Fuel storage area(s) would be lined and bermed to provide protection against accidental spills reaching the river. The containment area would be excavated or bermed, impermeably lined, and able to contain 110 percent of the fuel tank(s) volume. A continuous leak-detection system would also be required. All refueling would be carried out on an impermeable refueling pad designed to contain any spills or overfills. A spill contingency plan would be prepared along with final design of the staging area. A structural concrete batch (mixing) plant would be located at the staging area shown in **Figure 2-8**. This operation would produce some dust which would be controlled by watering. The river, or dewatering operations, would serve as the water source. A second continuous concrete batch plant such as a pug mill would be located at the staging area shown in **Figure 2-8** to mix the RCC. This operation would likely produce some dust which would be controlled by sprinkling with water from the river or dewatering operations.

Waste materials from construction (spoil) would be disposed of in a waste area used during the original construction and shown on **Figure 2-8**. Demolition of the existing spillway would require disposal of approximately 6,200 cubic yards of reinforced concrete materials. Reinforced concrete materials would be buried for safety.

The area design would include a runon-runoff protection plan to ensure contaminants are not delivered to drainages and, ultimately, the Tongue River. It would also include a plan for required utility upgrades for the site and a weed control plan. Areas under and adjacent to fuel tanks and stockpiles of concrete materials would be lined and bermed to prevent the release of contaminants, and vehicle parking and maintenance areas would be designed to prevent oils, fuel, and other contaminants from impacting soils, surface water, or groundwater. Lined settling ponds would collect process and runoff water from the facility. While a final water acquisition, use, and waste water disposal plan

Figure 2-8. Staging Area Plan

would be developed during final design, water is intended to be pumped from the Tongue River for use in operations, facilities, washing, and dust control. Gray and black water collected from washrooms and toilets would be collected and disposed of off site by a licensed operator. Water collected in settling ponds would be disposed of on site after testing established the acceptable quality of the water. A plan for fencing off the historic Lee Homestead structures would be an important aspect of area construction and operations planning. Efforts (e.g., fencing) also would be undertaken to preserve as many mature cottonwoods in the staging area as is possible.

2.3.1.7 Railroad Unloading Facilities

It is planned that a rail car load-out site of about 5 acres would be associated with this project in the Sheridan, Wyoming area for off-loading of riprap. The site may require the construction of a temporary load-out and attendant parking and turnaround areas for heavy equipment. It may also require adequate area for a materials stockpile and an excavator to remove materials from the gondola rail cars.

2.3.1.8 Water Conservation Option

A water conservation option could be pursued under the construction alternatives to increase the availability of water to satisfy the provisions of the Compact. Under this option, present water users would be given the chance to participate in a project-funded program designed to improve the efficiency of their water use (primarily irrigation). In return for participation, water users would be asked to give up some of their water right. Implementation of this option would be at the discretion of the final decision makers, and subject to subsequent NEPA compliance.

To increase efficiency, and improve the irrigation water delivery system, several methods could be used. Lining canals and laterals, improved water measurement devices, automated gates, sprinkler irrigation, use of "Best Management Practices", and changes in cropping patterns are some of these methods. The feasibility and anticipated water savings of each method would have to be determined.

It is unlikely that enough water could be obtained by this option to completely satisfy the Compact. This may merely augment the proposed additional storage to offset periods of drought.

There is resistance to giving up water rights either as a separate alternative or as a conservation option for this project. This resistance could be attributed to the infeasibility of changing current irrigation practices (flood compared to sprinkler irrigation), not wanting Government intervention in private irrigator operations, and not wanting to give up a water right, regardless of what was received in return. Also, under the State's Salvage Water Law (85-2-419), the water users would not be obligated to relinquish their right. Under the Salvage Water Law, conserved water could be used to increase their present irrigated acres.

If the water conservation option were included with an action alterative, a water conservation plan would be developed that would be presented to the water users. Additional environmental compliance would be completed for any implementation activities associated with this option. If implemented, the water conservation option would be considered a project cost.

2.3.2 Material Requirements

2.3.2.1 Labyrinth Weir Spillway

Aggregate and Cement

Approximately 30,600 cubic yards of aggregate and 8,000 tons of cement would be required for structural concrete used in construction at the left abutment for the labyrinth weir spillway. Aggregate would be provided from a local source, Site No. 1 (**see Figure 2-4**). Site No. 1 has been moved from Sand Point to Campers Point since publication of the draft EIS.

This site has been identified by DNRC as the source of aggregate for road improvement, structural concrete and RCC. Preliminary investigations by DNRC indicate that aggregate of sufficient quantity

and quality exists at the site. The site would be operated through fall and winter of 1996 when road improvements were being made and aggregate was being developed and stockpiled for the labyrinth weir. The site would have both crushing and screening operations. The site may require utility service upgrading for planned operations. The detailed site plan developed during final design would have runon-runoff protection and potentially a settling pond designed to collect runoff from the site. The detailed water acquisition, use, and waste water disposal plan would intend to acquire water from the reservoir for operations. Water collected in the settling pond could be disposed of on site if testing established the acceptable quality of the water. Gray and black water collected from washrooms and toilets would be collected and disposed of off site by a licensed operator. A licensed operator would collect all waste water and dispose of it at a licensed location.

Development of Site No. 1 would require an open cut mining permit from the Department of Environmental Quality (DEQ). No mining would be allowed until a reclamation contract was entered into with the Board of Land Commissioners.

Processing aggregate would require the use of a crusher and screening operation to provide the angularity and size distribution required. The crusher operation would produce dust which would be controlled by bag filtration. A washing operation also may be required to clean the structural concrete aggregate to remove any fines. The washing operation would require a water source and a settling pond to trap the fine sediments. Process water would be disposed of by sprinkler irrigation or percolation. Aggregate materials would be stockpiled both at Site No.1 and at the staging area for later use.

Reinforcing Steel

About 2,300 tons of reinforcing steel would be stockpiled on site.

RCC Aggregate and Cement

Approximately 61,000 cubic yards of aggregate would be required from Site No. 1 to construct the RCC foundation for the labyrinth weir spillway. There is potential for aggregate to be used from the north portion of Site No. 2 because it may be more cost-effective. However, it may be disruptive to the construction staging area. If exploration of Site No. 2 revealed suitable quality and quantity of aggregate and disruption could be minimized, then the quantity of aggregate taken from Site No. 1 would be reduced. (For a full discussion of Site No. 2, **see Alternative 2 *Construction Staging Area*** discussion.) About 7,400 tons of cement would also be required.

2.3.2.2 Low Level Outlet Works

Construction components of the new auxiliary and primary low level outlet works would include new operating gates, new emergency gates, and new hydraulic gate operators.

Aggregate and Cement

About 1,320 cubic yards of aggregate would be used in construction of the auxiliary and primary low level outlet works and 515 tons of cement would be required.

Reinforcing Steel

About 137 tons of reinforcing steel would be hauled in and stockpiled at the staging area.

2.3.2.3 Coffer Dams

Earth Fill

Construction of the upper and lower coffer dams would require 23,000 and 5,600 cubic yards of material, respectively. This material would come from the spillway excavations, Site No. 2, or the original borrow area located in the reservoir (**see Figure 2-8**).

2.3.2.4 County Road Improvements

Aggregate

Surfacing improvements to approximately 7.5 miles of County Road No. 380 would require approximately 19,000 cubic yards of road aggregate from Site No. 1.

2.3.2.5 Structure and Shore Erosion Protection

Riprap

No known quarries producing riprap have been identified adjacent to Tongue River Reservoir. About 91,000 cubic yards of riprap could be needed for structure and shore erosion protection. About 69,000 cubic yards of dumped riprap materials would be required to protect the Highway 314 embankment, and 22,000 cubic yards would be required to protect Decker Coal mine facilities and bridges and culverts in the upper reservoir area. A 30-inch-thick layer of dumped riprap materials would be provided with an average diameter of 15 inches. The amount of dumped riprap required for road protection could be reduced during final design if methods of erosion protection using vegetation were found to be suitable. If sufficient quantity and quality of riprap was found during excavation of the existing spillway or in the local area, the amount of imported riprap would be reduced.

The dumped riprap would be placed on the prepared embankment by shaping the existing embankment from elevation 3,432 feet downward to a point below elevation 3,428.4 feet. A filter fabric may be placed underneath the dumped riprap materials to prevent piping of fine materials through the dumped riprap layer. Site preparation and placement of riprap would take place when the reservoir was drawn down, to avoid water quality impacts.

2.3.3 Material Hauling

The staging of materials hauling in terms of time-of-year, truck numbers and sequencing and safety considerations would be developed during final design. Actual construction sequencing requirements, available staging area and materials production capacity may limit the number of trucks and trip frequency which would extend the number of days required to move the necessary tonnage.

Mixed structural concrete would be transported from the batch plant to the spillway construction site on short temporary haul roads by concrete mix trucks, pumps, or a system of conveyors. If conveyors were used, they would run from the construction staging area to the spillway.

Approximately 1,185 trips would be made to and from the staging area via County Road No. 380, Secondary Highway 314, Secondary Highway 338 and, possibly, Interstate Highway 90 for other construction materials such as reinforcing steel and cement.

The 1,185 trips made to deliver other construction materials could be staged strategically over the four-to-five-month period prior to and including preconstruction project activities such as mobilization and demolition. While a larger network of highways would be impacted by the construction material hauling, the delivery schedules would be planned during final design in a manner to minimize impacts on traffic.

2.3.3.1 Labyrinth Weir Spillway

Disposal of the existing spillway materials and excess excavation required to construct the spillway would require use of conveyor equipment, or about 33,000 round trips between the spillway excavation and the waste area using equipment with a 20-cubic-yard capacity.

Aggregate from Site No. 1 would be hauled to the construction staging area on County Road No. 380. Assuming 20 cubic yards per trip, approximately 1,530 trips would be required to transport the aggregate materials from Site No. 1 to the staging area.

Approximately 800 trips would be required to transport the cement material to the job site. These trips would require the use of County Road No. 380, Secondary Highway 314, Secondary Highway 338, and perhaps Interstate Highway 90.

Reinforcing steel would have to be hauled to the construction staging area using the same network of roads as for cement hauling. Assuming 15 ton loads per trip, approximately 115 trips would be required to transport the reinforcing materials to the staging area.

2.3.3.2 RCC Foundation

RCC aggregate would be hauled from Site No. 1 to the construction staging area on County Road No. 380. Assuming 20 cubic yards per trip, approximately 3,050 trips would be required to transport the aggregate materials from Site No. 1 to the staging area. If aggregate was obtained from Site No. 2, truck trips would be reduced on the county road.

Approximately 270 trips would be required to transport the cement materials to the staging area site. These trips would require the use of County Road No. 380, Secondary Highway 314, Secondary Highway 338, and possibly Interstate Highway 90. The materials would be stockpiled on site. The staging and stockpile areas would require reclamation.

Mixed RCC would be transported from the batch plant to the spillway construction site on short, temporary haul roads by trucks or heavy equipment, pumps, or a system of conveyors. Assuming 20 cubic yards per trip, about 3,050 truck trips would be required.

2.3.3.3 Low Level Outlet Works

About 220 truckloads of mixed concrete would be transported from the staging area to the outlet works sites by trucks and pumps for the low level outlet works.

2.3.3.4 County Road Improvements

Gravel from Site No. 1 would be hauled and used for graveling of County Road No. 380. Assuming 20 cubic yards per trip, approximately 950 trips would be required to transport the gravel.

2.3.3.5 Structure and Shore Erosion Protection

It is assumed that riprap would be brought in by rail to the Sheridan, Wyoming area from a source in eastern Wyoming, or that a source of local riprap would be located near Sheridan and trucked in. If rail was used, approximately 1,800 railroad carloads would be required to transport 91,000 cubic yards of riprap. The riprap would then be placed in trucks for transportation to each bank/structure erosion protection site.

Approximately 9,100 truckloads at 10 cubic yards per load would be required to transport the riprap to each job site from either a local source or the rail yard. The load maximum is based on highway load restrictions. Transport would likely take place via Interstate 90, Secondary Highway 338, Secondary Highway 314, county roads, mine roads, and undeveloped roads to each site.

2.3.4 Major Construction Activities

2.3.4.1 Reservoir Drawdown and Downstream Releases During Construction

Alternative 1 would require reservoir drawdown and construction of Coffer dams for three activities:

- construction of the labyrinth weir spillway foundation;
- construction of the auxiliary low level outlet works; and
- construction of modifications to the existing low level outlet works.

Construction of the coffer dams would require the reservoir to be drawn down to elevation 3,390.5 feet (approximately 9,000 af of storage) over a 1-to-2-month period during spring of 1997. A minimum upstream coffer dam elevation of 3,426 feet would provide protection from up to a 25-year flood and related overtopping.

The reservoir pool would be held at elevation 3,390.5 feet for several weeks to allow for the construction of the upstream coffer dam. Upon completion of the upstream coffer dam, the reservoir would be filled from spring runoff to elevation 3,409 feet (about 30,000 af of storage). The reservoir would then be drawn down to elevation 3,390.5 feet to meet summer irrigation deliveries. The intake structure for auxiliary low level outlet works would be constructed during the fall of 1997. Placement of

the new gates in the primary low level outlet gate tower and construction of the new downstream conduit would immediately follow.

The reservoir would then be allowed to refill to elevation 3,409 feet (30,000 af) during the spring of 1998. This water would be used to meet releases for contract water users during the summer of 1998. Construction of the labyrinth weir spillway would continue through the summer and fall of 1998. Upon completion of the spillway, the reservoir would be allowed to refill to the new spillway crest elevation of 3,428.4 feet (about 80,000 af of storage) during the 1999 runoff season.

During the construction period, a target release of run-of-river flows or up to 190 cfs would be maintained through the low level outlet works to reduce impacts to aquatic life and fisheries. Delivery of water to contract water users could be interrupted or reduced during the summers of 1997 and 1998.

Preliminary analysis by DNRC indicates that the project may be able to store up to 30,000 af of contract water during construction. The amount stored would depend on the alternative selected, the actual construction schedule, and the risk of acceptable flooding during construction as determined by DNRC. Water stored during construction would be captured at the end of the runoff season and released for irrigation (July to August).

2.3.5 Overall Construction Schedule

2.3.5.1 Description of Construction Steps

The sequence, estimated time requirements, and scheduling of each construction activity are shown in **Figure 2-9**.

2.3.5.2 Employment Requirements

Preconstruction Employment

The estimated employment requirements during preconstruction are shown on **Table 2-1**. **Figure 2-10** displays employment scheduling. Labor would be required for road improvement activity preceding construction; aggregate extraction, crushing, screening and washing operations; riprap hauling and placement; and aggregate hauling.

Construction Employment

Estimated employment required for construction activities is shown on **Table 2-2**. **Figure 2-11** displays employment scheduling. A primary contractor would be hired to construct repairs to the dam. It is assumed that a core work force associated with construction would be brought in by the contractor for administrative, supervisory, and key operator positions. A target of 100 percent of the local hire (**see Glossary**) total labor positions estimated for all construction and related activities would be occupied by members of the Northern Cheyenne Tribe (**see Chapter 3, *Socioeconomics***). This is estimated to be approximately 75 percent of the local workforce. **See Glossary** for definitions of "local hire" and "local workforce." These laborers would travel daily to and from the work site to centers such as Ashland, Birney Village, Lame Deer and Busby. Other laborers would likely travel from Billings, Montana and Sheridan, Wyoming or outlying areas. Tribal members could also camp on their newly acquired land near Tongue River Reservoir (**see Figure 2-4**).

Mitigation Employment

Employment required for mitigations would be associated with the tasks listed in **Table 2-3.** A target of 100 percent of the local hire labor positions estimated for all mitigation and enhancement activities would be occupied by local members of the Northern Cheyenne Tribe. This is estimated to be approximately 75 percent of the local workforce. **See Glossary** for definitions of "local hire" and "local workforce."

TABLE 2-1: Estimated Preconstruction Employment

Task	Skilled Labor By Task and Crew Size	Semi-Skilled Labor By Task and Crew Size	Total Employment
Aggregate Development	4	1	5
County Road Improvements	5	2	7
Riprap Erosion Protection	15	7	22
TOTAL	24	10	34

Task Name	Start Date	End Date
Start Construction	8/1/96	8/1/96
Road Work	8/1/96	8/12/97
Aggregate Source Development	10/1/96	6/20/97
Construct Labyrinth	3/24/97	9/14/98
Construct Aux. Outlet	8/21/97	12/17/97
Construct Outlet	5/22/97	7/17/98
Reservoir Drawdown	4/24/97	7/29/98
Cleanup	8/17/98	9/15/98

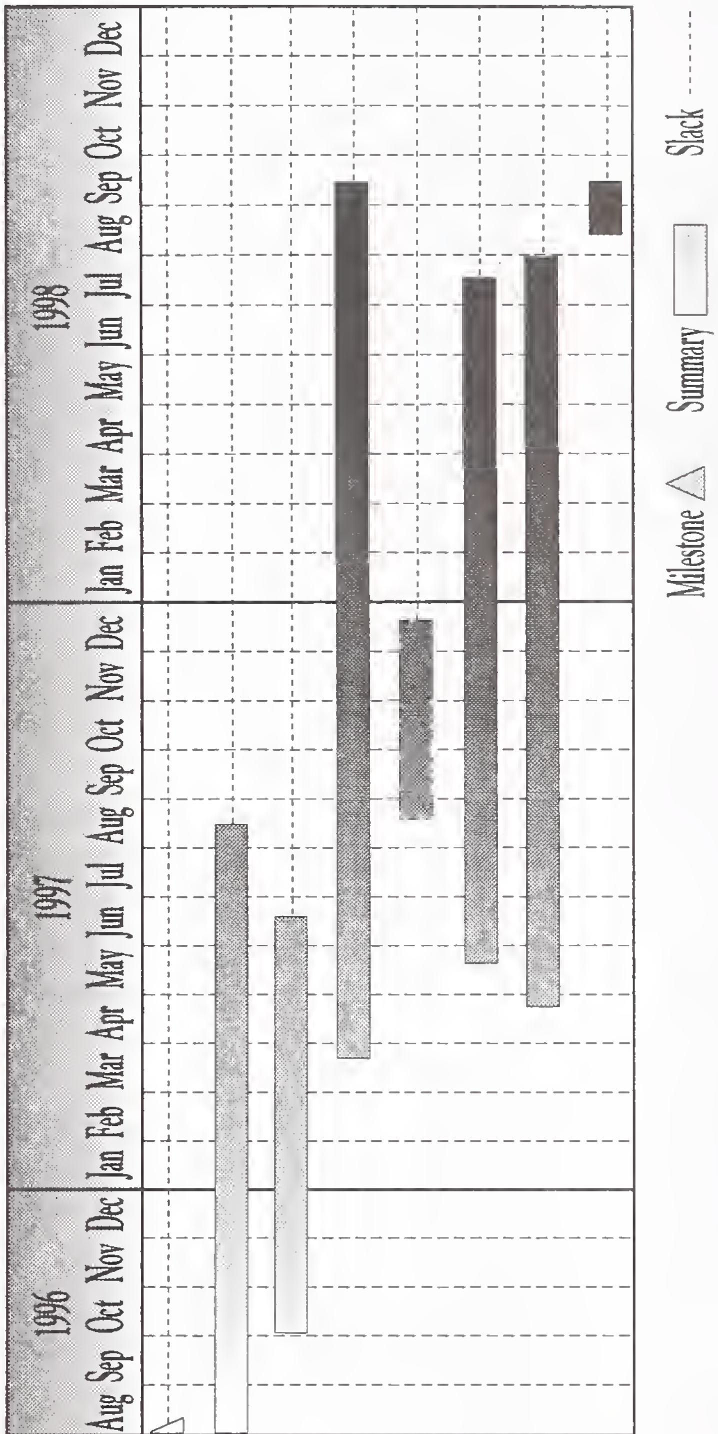


Figure 2-9. Project Timeline for Labyrinth Weir

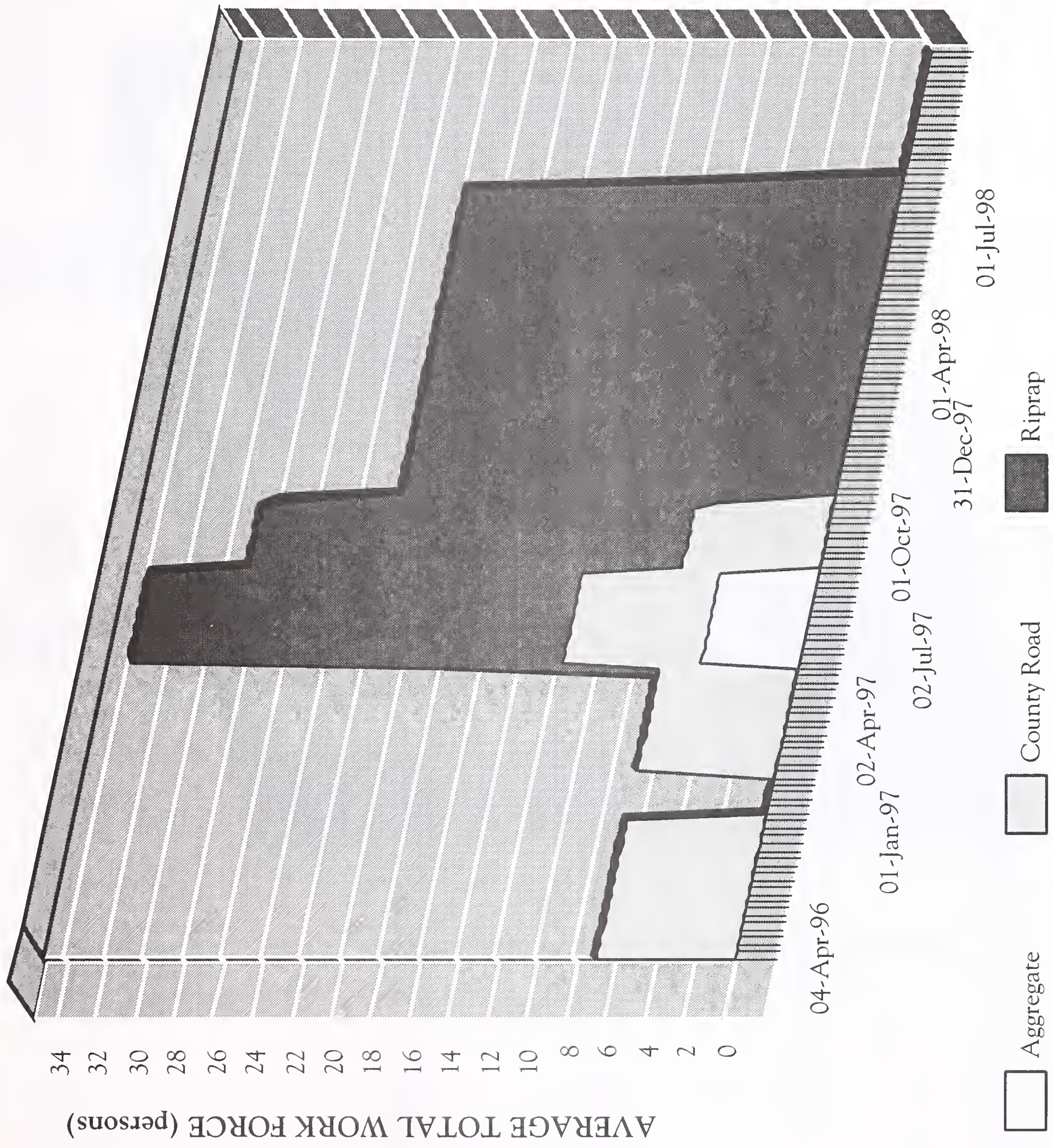


Figure 2-10. Estimated Workforce Preceeding Construction

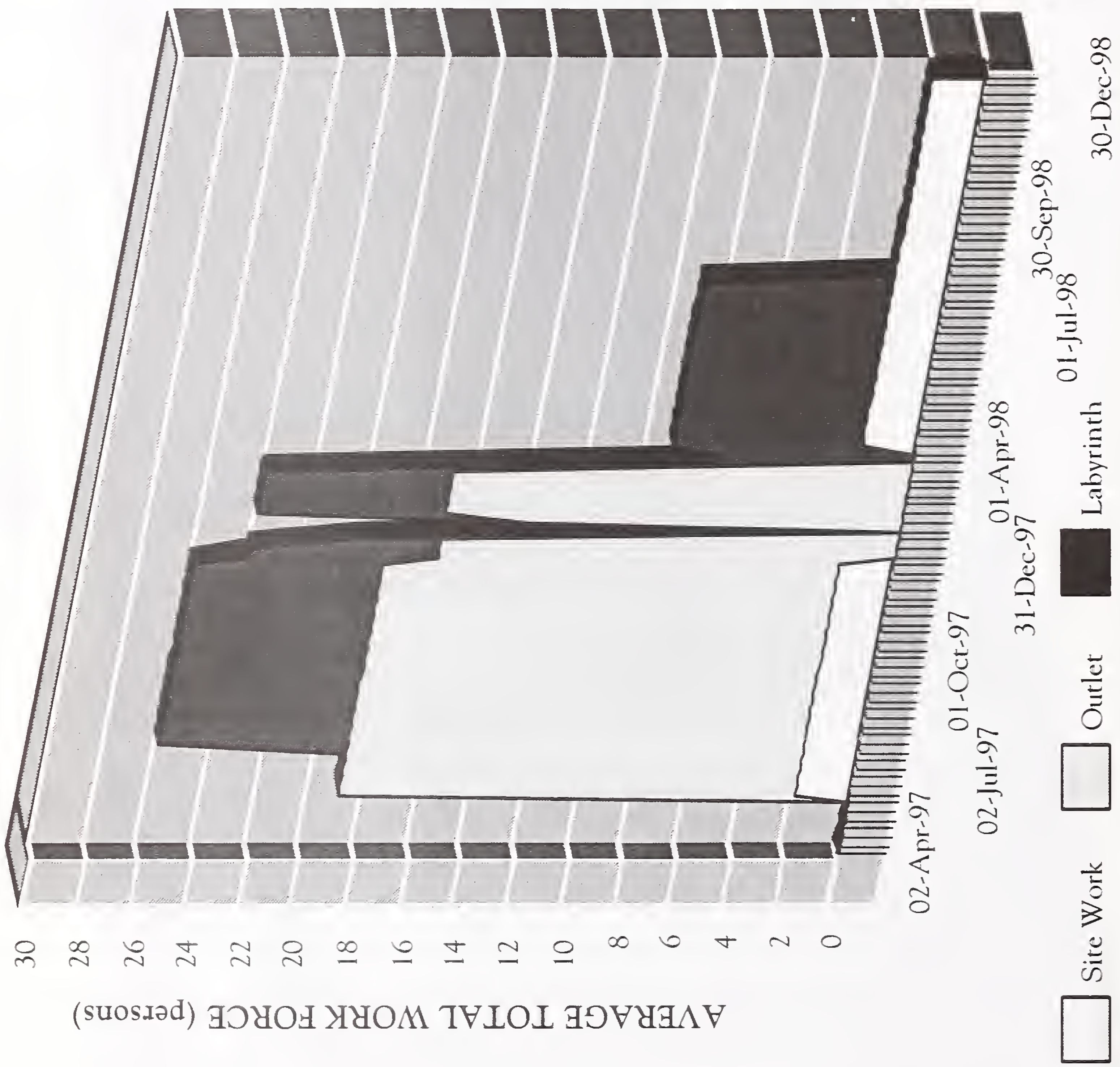


Figure 2-11. Estimated Workforce Labyrinth Alternative

2.3.6 Probable Construction Cost Estimate

The probable construction cost estimate for Alternative 1 is shown in **Table 2-4** and equals $26,928,825 for the dam safety improvements. This cost does not include construction activities associated with the overall project such as the county road improvements, structure and shore erosion protection, mitigation, and enhancement. Including other construction-related costs, the cost estimated for this project is $37-40 million.

TABLE 2-2: Estimated Employment During Construction for Alternative 1

Task	Skilled Labor By Task and Crew Size	Semi-Skilled Labor By Task and Crew Size	Total Employment
Site Work & Reclamation	1	1	2
Low Level Outlet Works	11	6	17
Labyrinth Spillway Structural Concrete	5	2	7
TOTAL	**17**	**9**	**26**

2.3.7 Land Disturbance

Up to 157 acres would be disturbed if Alternative 1 was implemented including 60 acres for aggregate mining, 56 acres for county and campground roads, 5 acres for rail load-out at Sheridan, and up to 36 acres for the construction staging areas.

TABLE 2-3: Estimated Employment for Mitigation[1]

Task	Skilled Labor By Task and Crew Size	Semi-Skilled Labor By Task and Crew Size	Total Employment
Coal Mine	1	2	3
Riparian Planting, Constructing Wetlands	1	5	6
Livestock Exclusion Fencing	0	2-3	2-3
State Park Improvements	2	2	4
TOTAL	**4**	**11-12**	**15-16**

Note: [1] Employment estimates for enhancement are not included in these employment figures since specific projects and employee requirements are unknown at this time.

TABLE 2-4: Probable Construction Cost Estimate for Labyrinth Weir Spillway

Description	Quantity	Unit	Unit $	Amount
Mobilization & Prep		LS		$1,165,750
Demo Spillway	6,200	cy	80	496,000
Excavation-50% Rock	660,000	cy	5	3,300,000
Backfill	140,000	cy	3	420,000
Compacted Fill	35,000	cy	6	210,000
Riprap	3,000	cy	30	90,000
Bedding	1,000	cy	30	30,000
Anchor Bars	84,500	lf	10	845,000
8" SP Drain Pipe	6,800	lf	20	136,000
Weir Floor Concrete	6,800	cy	220	1,496,000
Weir Wall Concrete	5,300	cy	250	1,325,000
Chute Floor Concrete	9,500	cy	220	2,090,000
Chute Wall Concrete	1,400	cy	250	350,000
Basin Floor Concrete	6,200	cy	220	1,364,000
Basin Wall Concrete	1,400	cy	250	350,000
RCC	61,000	cy	45	2,745,000
Cutoff Wall Concrete		LS		270,000
Cement	15,400	tons	90	1,386,000
Reinforcement	2,300	tons	1,000	2,300,000
Upstream Coffer Dam	23,000	cy	8	184,000
Downstream Coffer Dam	5,600	cy	5	28,000
River Diversion		LS		150,000
Dewatering		LS		250,000
New Outlet Works	1	LS		3,500,000
Subtotal				24,480,750
10% Contingency				2,448,075
TOTAL				**$26,928,825**

Note: LS=lump sum, cy=cubic yards, lf=lineal feet
Note: Final design will determine actual construction costs. The estimates provided herein are for comparative purposes only.

2.3.8 Facility Monitoring and Reclamation

2.3.8.1 Construction Staging Area

The construction staging area would be used for a period of 18 to 24 months between 1996 and 1998. The area would have to be constructed in accordance with approved facility site preparation, operation, and reclamation plans developed during final design of the site. The wetland adjacent to the proposed staging area would be accounted for, avoided if possible, and/or mitigated as part of the overall wetland mitigation plan. Plans would be developed in consultation with the construction contractor to minimize and/or prevent damage to cottonwood trees in the area. Roads, vehicle parking, and equipment operation and storage would be designed to prevent oils, fuel and other contaminants from impacting soils, surface water or groundwater. Lined settling ponds would collect process and runoff water from the facilities. Contingency plans for protection of ground and surface water targeting equipment maintenance, fuel, and other hazardous materials would be developed to ensure contaminants were not delivered to the Tongue River.

The performance of water quality protection features at the staging area and other construction operation sites would be monitored during the 18 to 24 months of operation. Necessary repairs and adjustments would be made immediately with curtailment of relevant operations, as required. Regular inspections of leak containment systems, runon/runoff protection systems, gray and black water containment systems, and process runoff collection systems would be conducted along with continuous monitoring of a possible dust reduction system relative to crushing and screening operations. Settling pond maintenance would be conducted as necessary to maintain design capacity requirements.

Air quality impact abatement measures would be required for continuous dumping and wind erosion associated with the waste dump area, transport of materials between sites, lack of intermediate cover at the waste pile, and exposed soil and materials stockpiles. Air quality monitoring could be required at the construction staging area if crushing and screening operations used aggregate from Site No. 2 (see discussion under ***Construction Staging Area*** and ***Alternative 2***).

The staging area would be reclaimed following construction. Recontouring to preoperation contours, cleanup of debris and hazardous materials, scarifying of roadways and compacted areas, and reseeding to establish natural vegetation would be incorporated into reclamation plans. The proposed fuel and repair area would be revegetated after first removing or treating any contaminated soils. Portions of the staging area may be reclaimed as wetlands.

Reclamation plans for the remainder of the project would be developed during final design that reflected the requirements of all permit and relevant environmental regulations. Recontouring to preoperation contours, scarifying roads and compacted areas for seedbed preparation, reseeding with a prescribed vegetative mix, and cleanup of debris and other project generated materials would be conducted. Containment systems for storm and process water would be removed, with liners and impacted materials appropriately disposed of off site. Settling ponds would be excavated, liners would be removed, sites would be restored to pre-project contours and reseeded, if appropriate.

Fueling Facilities

After project completion, the impermeable refueling pad, containment area, and tanks would be removed and reclaimed. The area would be recontoured (if necessary), and soils prepared for reseeding in native grasses. Any contaminated soils would be disposed of in accordance with approved reclamation plans that reflected the requirements of all permits and relevant environmental regulations.

Fishing Access Site

The current fishing access site, proposed as a parking area during construction, would be reclaimed and restored as described under ***Recreation Mitigation*, Section 2.3.9.10**.

Waste Disposal Area

At project completion, the rectangular-shaped waste pile is projected to contain up to 500,000 cubic yards of additional materials and would encompass about

7 acres and be up to 50 feet high. The pile would be located at the base of the hills on the west side of the river. Reclamation would include recontouring so that its profile appeared to be an extension of the adjacent slope. Reclamation of the area would be carried out in accordance with an approved reclamation plan that reflected the requirements of all permits and relevant environmental regulations. The detailed site plan for the waste area would propose the precise size, location, and final topographic configuration, cover, and runon/runoff protection for the area.

2.3.8.2 Aggregate Site No. 1

During road improvement and construction, this site would be monitored as to the performance of air and water quality protection features. Necessary repairs and adjustments would be made immediately with curtailment of relevant operations as required. Regular inspections of runon and runoff protection systems, gray and black water containments systems, and process runoff collection systems would be conducted along with continuous monitoring of the dust reduction system. Settling pond maintenance would be conducted as necessary to maintain design capacity requirements.

Reclamation of aggregate Site No. 1 would be in accordance with a reclamation plan developed during final design that reflected requirements of all permits and relevant environmental regulations. Final topography would reflect the potential to create a shallow-water bay adjacent to developed recreation facilities at Campers Point.

2.3.8.3 Aggregate Site No. 2

See discussion under ***Alternative 2***.

2.3.8.4 Haul Roads

County roads would remain in their improved and realigned condition. The short-haul road between Site No. 1 and the county road may remain in place as an internal campground road.

2.3.8.5 Railroad Unloading Facilities

During construction, operations at these sites would be monitored for the performance of air and water quality protection features. Necessary repairs and adjustments would be made immediately with curtailment of relevant operations as required. Settling pond maintenance would be conducted as necessary to maintain design capacity requirements.

Portions of these sites have been disturbed previously. Reclamation would be appropriate to future plans for the site. Reclamation would be in accordance with a plan developed during final design that reflects requirements of all permits and relevant environmental regulations.

2.3.9 Proposed Mitigations and Monitoring

Mitigation plans have been prepared to address anticipated impacts from this project (**see Chapter 4**). All mitigations suggested below would be implemented under either of the construction alternatives.

2.3.9.1 Public Safety Mitigation

An emergency mock evacuation drill for persons living in the Tongue River Basin below the dam may be held in fall 1996, prior to initiation of spillway construction. This drill may be coordinated by Disaster and Emergency Services.

2.3.9.2 Agricultural Mitigation

DNRC has prepared an agricultural mitigation plan entitled *Tongue River Basin Project Downstream Agricultural Mitigation Plan.* This plan is incorporated by reference into this EIS and is available on file at DNRC. The following steps, summarized from the mitigation plan, have been proposed by the project sponsors to mitigate potential downstream agricultural losses during construction:

1) At a minimum, to supply run-of-river releases (outflow from dam = inflow to reservoir) during the irrigation season. This would supply water to decreed water users that would normally be available without using water stored in the reservoir.

2) Monitor streamflows immediately downstream of the dam, at Birney Village, at Ashland, near the Brandenburg Bridge, at Miles City, and in the Tongue and Yellowstone (T&Y) canal downstream of the canal crossing of Pumpkin Creek. Water would be "tracked" (possibly by a temporary water commissioner) down the river to ensure that it reached the T&Y diversion. T&Y holds an early, large water right, the second decreed right on the river for 187.5 cfs. As a minimum, this would maintain the status quo (i.e., keep the stream flowing between the dam and the T&Y diversion). The Tongue River historically has been dewatered, or nearly so, below the T&Y diversion during the irrigation season.

3) Plan construction, assess the risk of storing water during construction, build coffer dams, and schedule drawdown with the objective of storing as much water as possible for delivery to water contract holders.

4) Potentially compensate agricultural producers for a portion of incurred losses. The means of compensation will be determined by negotiations between the Tongue River Water Users Association and the project sponsors. Compensation will include payment for lost crop production or credit for water not delivered.

2.3.9.3 Wildlife Mitigation

USBR prepared a mitigation plan entitled *Tongue River Basin Project EIS Fish and Wildlife Habitat Mitigation Plan (1994).* This document is incorporated by reference into this draft EIS and is available on file at DNRC. A critical component of this plan involves an Interagency Mitigation and Enhancement Team (Team) consisting of representatives of the project sponsors, U.S. Fish and Wildlife Service (USFWS), the Montana Department of Fish, Wildlife and Parks (DFWP), and Bureau of Indian Affairs (BIA). The Team was chartered to identify and implement necessary and beneficial mitigation measures. The primary resource areas addressed by the Team included wildlife resources, aquatics and fisheries, additional habitat in the project area, and wetlands. Proposed mitigations for the resource areas, which are entirely separate from project-related fish and wildlife enhancement activities, are described below.

From USBR's mitigation plan, the project sponsors propose to implement the following wildlife mitigations:

1) Establish a wildlife management area encompassing 600 to 1,000 acres of suitable project lands and lands to be acquired for the mitigation of woody and herbaceous riparian wildlife habitat lost due to the project. The wildlife management area could be established by acquisition of land through fee title or easement and may be developed and managed in conjunction with the enhancement measures presented in ***Fish and Wildlife Habitat Enhancement Features***. Areas currently being investigated for wildlife management purposes are located throughout the entire Tongue River Basin.

   The wildlife management area will include up to 200 acres of naturally established wetlands, up to 50 acres of newly constructed wetlands, up to 250 acres of riparian vegetation, and 328 acres of grassland and scrub forest.

2) Renovate and improve the Pike Pond waterfowl impoundment located in Section 15, T9S, R40E, (**see Figure 2-4**) in order to preserve its existing wildlife habitat. A portion of this proposal is a component of the wetlands mitigation plan discussed in **Section 2.3.9.6**.

2.3.9.4 Aquatics and Fisheries Mitigation

The plan also sets forth the following fisheries mitigation measures:

1) Initiate a supplemental walleye stocking program for Tongue River Reservoir following refilling, using 10,000 8-inch yearling fish annually, for a 2-year period. Costs are estimated to be $20,000 for the entire stocking program ($16,000 for the fish and $4,000 for transporting them from an available source).

2) Establish a program to monitor, and possibly restock, the spottail shiner population in Tongue River Reservoir. Monitoring would cost about $1,000, while restocking, if required, would cost about $4,000 over a 2-year period.

3) Establish a program to monitor and possibly restock smallmouth bass in the reach of Tongue River between the dam and Ashland. Monitoring would cost an estimated $3,600 while restocking, if required, would cost about $38,400. A one-time stocking of 128,000 2-inch fingerling smallmouth bass would be conducted.

4) Initiate a supplemental smallmouth bass and channel catfish stocking program in the reach of Tongue River between Ashland and the T&Y Diversion Dam (**see Figure 1-1**) if determined to be necessary. The one-time introduction of 155,000 2-inch fingerling smallmouth bass and 77,500 2-inch fingerling channel catfish would be conducted after project construction and restoration of normal streamflows. Total cost is estimated at $52,000.

5) Provision will be made in an agreement between the project sponsors and DFWP or other suitable instrument for mitigating the impacts of fishery resources of any unanticipated events, such as a drastic winter-kill during reservoir drawdown or an emergency or other short-term shutdown of water releases at the dam during project rehabilitation. Restocking, water pumping (to provide fish survival flows in the river), or other costs will be included among project costs for fishery mitigation.

6) To minimize impacts to downstream aquatics, DFWP would monitor the condition of the river downstream of the dam during construction of the project. A target release of run-of-river flows or up to 190 cfs would be maintained during the construction period with the exception of low flows during installation of the low level outlet works. The minimum flow released would be 75 cfs. If excess streamflow allowed, releases beyond maintenance level would be made in mid-May to September to facilitate spawning runs of warm-water species and provide improved aquatic habitat. DNRC's current monitoring of Tongue River flows at Miles City will continue following construction.

7) Restock the rainbow trout population in the Tongue River downstream of the reservoir.

2.3.9.5 Additional Habitat Mitigation

Habitat would be affected by fluctuating reservoir water levels: low during construction and high following runoff. General measures that would be taken to protect habitat values include:

1) Reservoir levels will be maintained at the highest possible elevation at all times during the construction period. These levels would be governed by safe operating limits for the reservoir as well as water for contract holders and other needs described below.

2) To maintain instream flows during critical periods during construction, funds will be made available in the project budget to lease water from willing agricultural water users, provided the state has in place a monitoring and enforcement program to stop lower priority diversions.

3) To replace habitat lost to inundation, the project sponsors would conduct a planting program above the new high water mark in suitable areas to mimic or enhance existing riparian conditions to expedite reestablishment of riparian communities and diversify existing habitat where feasible.

4) Regeneration of cottonwood and willow stands from existing seed sources will be enhanced by site preparation. Timing of preparation with the relatively short duration of seed viability is critical.

5) Improve riparian zones by fencing cattle out of critical areas along the reservoir, restricting campers to designated areas, instituting programs to eradicate salt-cedar (*Tamarix chinesis*) from the reservoir vicinity, and controlling noxious weeds.

6) Clearing woody vegetation will be limited in the new pool area to areas critical for safety or dam operations. Existing willows would be left wherever possible to speed the reestablishment of forage fish and juvenile predators after the construction drawdown. Large cottonwoods killed by the new pool would be left wherever possible to provide nesting and perching habitat.

7) Reclamation of disturbed areas will be conducted according to a weed control plan developed by the project sponsors in consultation with county weed districts and in compliance with the Noxious Weed Control Act.

2.3.9.6 Wetlands Mitigation

The project sponsors, in consultation with the U.S. Army Corps of Engineers (COE), the U.S. Environmental Protection Agency (EPA), and the U.S. Fish and Wildlife Service (USFWS) are determining wetlands mitigation requirements based on the wetlands functions and values that would be lost or degraded as a result of the proposed project. Proposed wetlands mitigation measures will be designed to compensate for lost or degraded wetlands functions and values and to comply with Section 404 of the federal Clean Water Act, which authorizes COE and EPA to regulate activities that would place dredge or fill materials into wetlands and surface waters of the United States. Additional considerations are: 1) that wetlands be mitigated as close as possible to the project site; and 2) that lands affected by the measures be prioritized to avoid conversion of high quality upland habitat (e.g., native prairie, woody draws, and forest communities). All wetland mitigation sites will be evaluated for adequacy of water supply, projected wetland functions and values, and benefits that would result from mitigation.

Using the COE's 1987 Wetland Delineation manual, the project sponsors have delineated approximately 314 acres of jurisdictional wetlands that will be affected by the proposed work. All these wetlands are below elevation 3,422 feet, the existing project ordinary high water mark. These acres of jurisdictional wetlands will be affected by the project, even if the reservoir level is not raised. These wetlands can be grouped into five general categories: sandbar willow wetland, water smartweed wetland, cattail marsh, tufted foxtail wet meadow, and mixed inclusions. It is expected that up to 165 acres of sandbar willow wetland will be lost to the proposed work. Additional losses of 94 acres of water smartweed wetland, 5.4 acres of cattail marsh, 3.1 acres of tufted foxtail wet meadow, and 51 acres of mixed inclusions are expected.

When completed, a formal wetlands mitigation plan, including review and input from COE, EPA, and USFWS, will be forwarded as part of the project sponsors' Clean Water Act Section 404 permit application.

2.3.9.7 Threatened, Endangered and Candidate Species Mitigation

USBR (Albers 1995) prepared a Biological Assessment entitled *Biological Assessment: Tongue River Basin Project.* This document, included in **Appendix B**, states the project sponsors' commitments to avoid adverse impacts to threatened, endangered, and candidate species occurring in the project area.

2.3.9.8 Cultural Resource Mitigation

Project elements that potentially could have an effect on cultural resources shall be conducted in accordance with a Memorandum of Agreement (MOA) amongst USBR, Montana State Historic Preservation Office, and the Advisory Council on Historic Preservation. Possible cultural resource mitigations would be decided upon in consultation with appropriate parties, such as the Tribe and affected landowners, and in consideration of comments received. The MOA will assure that federal agencies comply with laws that address protection of cultural resources. The Tribe, BIA, and DNRC will be concurring parties to the MOA.

DNRC contracted for the preparation of a cultural resource inventory report entitled *Cultural Resource Investigations of the Tongue River Dam Project Big Horn County, Montana.* This document is incorporated by reference into this EIS. This report, which has been reviewed by USBR and other interested parties, describes the cultural resources in the area of effect as defined by DNRC in 1992, 1994, and 1995. The report covers the portion of the complete project area of potential effect (APE) that deals with the dam rehabilitation component of the Tongue River Basin Project. Other project components like enhancement and specific Tribal water uses will be dealt with by USBR or BIA respectively at a later date.

2.3.9.9 Coal Mine Facilities Mitigation

DNRC contracted a consultant to conduct a mitigation study entitled *Tongue River Dam Rehabilitation Project Decker Coal Company Mine Mitigation Study.* The purpose of the study was to assess the impacts of the proposed project on Decker Coal Company facilities and operations and provide methods and costs for

mitigating potential impacts. The document organizes the assessment and mitigation study into ground and surface water components. This document is incorporated by reference into this EIS and is available on file at DNRC.

Groundwater seepage into mine pits would increase as a result of the proposed rise in the water surface elevation of Tongue River Reservoir. Mitigation proposed for groundwater seepage impacts includes providing additional power for pumping and greater pumping capacity, additional sediment pond capacity, and obtaining permission to increase annual discharge under the Montana Pollutant Discharge Elimination System (MPDES) from Montana DEQ.

Surface water inundation at the mines (East Decker, West Decker, and the north extension of West Decker) would be associated with 100-year flood flows into the reservoir. Either the labyrinth weir or RCC alternative would accommodate the 100-year, 24-hour design flood which could impact soil stockpiles, monitoring wells, embankments, and water treatment and control facilities at the coal mines. Proposed mitigation for soil stockpiles includes removal of the stockpiles or construction of protective dikes. Monitoring wells could be abandoned and replaced, or casings could be extended and an elevated access provided to the well locations. Embankments would be protected with approximately 22,000 cubic yards of riprap. Four MPDES monitoring stations would require replacement as mitigation if either construction alternative were constructed. Water Treatment/ Control Pond R-1 at East Decker Mine would require mitigative rehabilitation if the RCC alternative were constructed.

2.3.9.10 Recreation Mitigation

The project sponsors propose a program of recreational mitigations at the Tongue River State Park to replace existing facilities. DFWP also proposes to conduct a program of recreational improvements at the state park. A number of these improvements are cost-shared with the project sponsors' mitigations. These shared improvements/ mitigations are described below and presented in **Figure 2-12**. (DFWP's planned park improvements that are not cost-share items are discussed under Reasonably Foreseeable Activities.)

1) About 3,000 feet of new or relocated internal park roads would be built to accommodate the new water level and park facilities. About 5,600 feet of existing internal roads would be reclaimed.
2) The existing 100-foot-by-50-foot man-made sand beach at Sand Point would be replaced or relocated above the new water line.
3) A new 200-foot-by-24-foot boat ramp would be built at Campers Point to replace the existing ramp that would be inundated.
4) A new 80,000-square-foot parking area at the ramp would be developed to accommodate boat launching and removal.
5) A concession building at Campers Point would be located above the new water line.
6) A new well and septic system would be developed to replace the existing facility at Campers Point.
7) Eighteen single latrines (handicap accessible) would replace 11 existing single and three double latrines.
8) Eleven new picnic shelters would replace nine existing shelters.
9) About 7,600 linear feet of shoreline at recreation sites would be revegetated at full pool.
10) Thirty fire rings would be replaced or relocated to areas suitable for camping and/or day use.

Recreation mitigations would be implemented during the construction and reclamation phase of the project, and would be in accordance with applicable requirements (e.g. Land and Water Conservation provisions).

Campers Point Mitigation

The following mitigation measures would be implemented to address impacts resulting from mining of aggregate at Campers Point. These measures would be developed in more detail as appropriate following development of the mining and reclamation plan.

1) Closure of camping areas, the boat ramp, and marina facilities at Campers Point would occur no earlier than September 3, 1996 following the Labor Day holiday weekend.

2) Public information signs would be erected at major access points to the state park prior to Memorial Day weekend of 1996, informing the public of upcoming closures at the park and areas of the park available for public use.

3) Public access to camping areas at Rattlesnake Point and Sand Point would be maintained until November 1 (or ice-up) of 1996. Portions of PeeWee Point would be open for public use depending on construction requirements for the alternate boat ramp.

4) An alternate concrete boat ramp for public access would be provided at the time of closure of the Campers Point boat ramp.

5) Marina services (gasoline, groceries, ice, and potable water) would be provided to the public at the existing location or a new location during park reconstruction through the 1997 recreation season.

6) Planned mitigation and park improvements for Campers Point would begin during the first construction season following the completion of aggregate mining and continue as necessary through the construction season of 1998. Parts of the state park at Rattlesnake, PeeWee, and Sand Points and possibly Campers Point would remain open for public use during the completion of park improvements.

7) The mining and reclamation plans for Campers Point would result in a shallow-water bay. The accessibility of this bay to boats during all summers would depend on final reservoir operation plans and the extent of future Tribal and Wyoming water use. Reclamation plans would include movement of overburden to shape the bay and provide adjacent shoreline areas for recreation and marina activities, stabilization of banks to decrease erosion potential from waves, providing a bay subsurface and perimeter free of obstacles for boaters, and ensuring no creation of stagnant pools within the bay during extremely low water. A ridge formed by mining along the southeast edge of the pit would be either removed, filled to above high water line, or otherwise modified to minimize a potential navigation hazard.

8) The segment of existing County Road 380 located within Rattlesnake, Campers, PeeWee, and Sand Points would be downgraded to an internal park road or reclaimed as indicated on the final park design.

9) Stockpiles of overburden, topsoil, and aggregate necessary for dam reconstruction, planned park improvements, and construction of County Road No. 380 would be located to the greatest extent possible in areas to be disturbed by construction activities. Existing vegetation located in areas of the park that would be undisturbed by mining or planned park improvements would be preserved to the greatest extent possible.

10) The Project would reimburse DFWP for revenue lost as a result of activities related to project construction and park mitigation, but not for activities related to park enhancement.

11) DNRC would create, where feasible, pullouts and/or vehicular access from County Road 380 to near-shore areas north of Sand Point to the dam (such as Monument Creek).

Tongue River Fishing Access Site

The following measures would be implemented to address impacts resulting from construction activities at the fishing access site below the dam.

1) DNRC and DFWP would identify during an on-site visit selected cottonwoods on the west side of the river to be protected during dam construction. The area surrounding these trees would be fenced to prohibit motorized access and protect their root structure during construction.

2) The reclamation plan for the staging area following construction would incorporate the following elements where determined feasible by DNRC and DFWP:

   - a revegetation plan that uses grasses, forbs, shrubs, trees and wetland species to restore preconstruction site conditions

   - site grading on the west side of the river that would create a parking area for 8-10 cars, a streamside approach for launching canoes and boats, and locations for future campsites

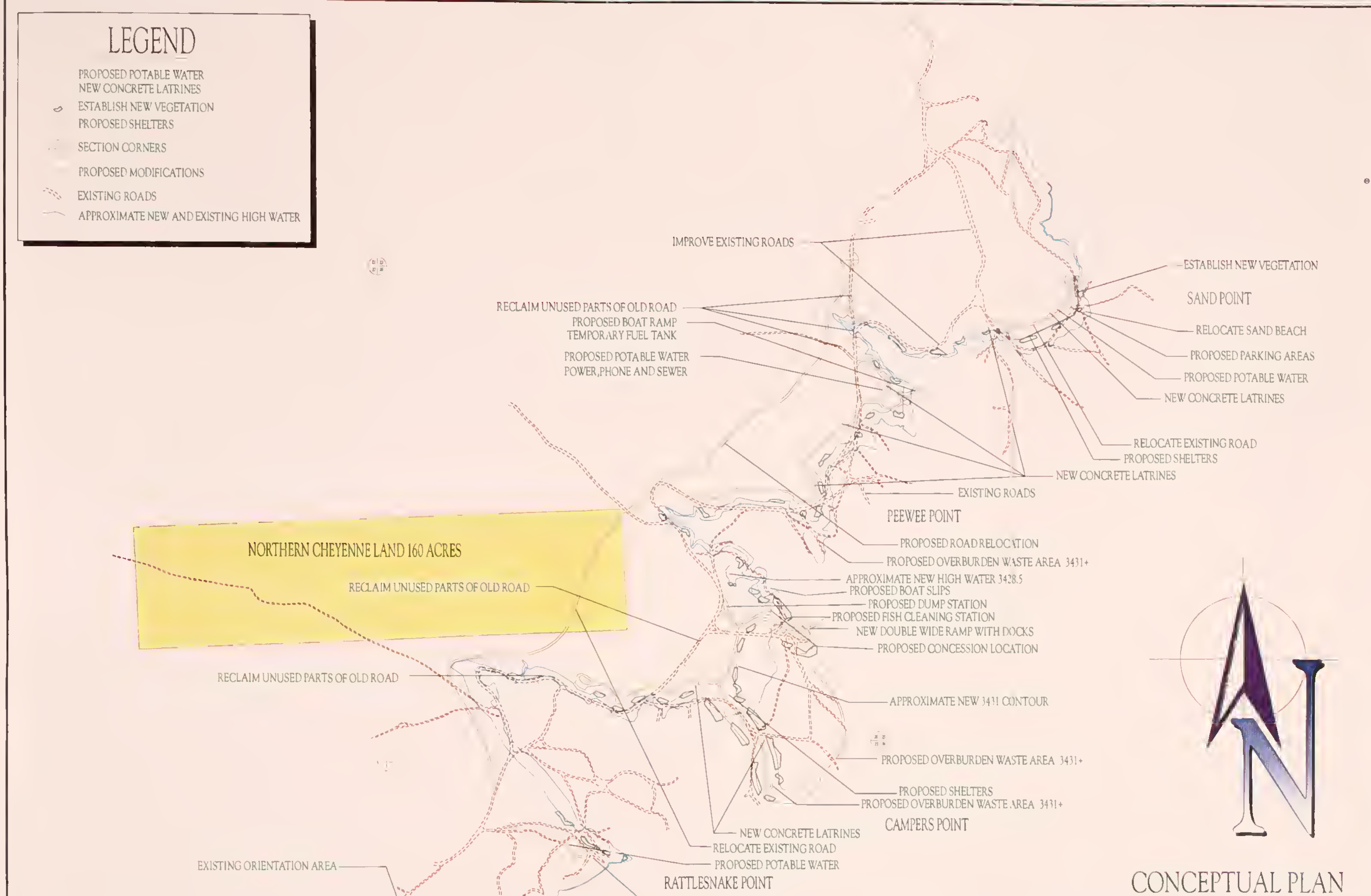


Figure 2-12. Recreation Mitigation and Enhancement Site Plan

- use of leftover aggregate from construction, if available, to gravel the parking area and other roads and approaches

- providing for future public foot access to the reclaimed staging area east of the river if compatible with public safety and long-term maintenance requirements as determined by DNRC.

3) If the existing latrines are damaged or removed during construction as determined by DFWP and DNRC, two single latrines (handicap accessible) would be installed on the west side of the river.

4) If the existing picnic shelters are damaged or removed during construction as determined by DFWP and DNRC, two picnic shelters with concrete tables would be installed on the west side of the river.

2.3.9.11 Geologic Mitigation

DNRC recently has placed a permanent benchmark above the landslide and several monitoring points in the slide area located at the northeast end of the reservoir in Section 13, T8S, R40E (**see Chapter 3, *Geology***). These benchmarks will be monitored to alert management agencies if ground movement were observed. Appropriate measures will be taken if such movement occurred.

2.3.9.12 Transportation Mitigation

In order to mitigate transportation-related impacts, the following measures are proposed:

1) County Road No. 380 would be relocated, and reconstructed. The relocation would be mostly complete before major material hauling to the dam site began, to safely accommodate recreational traffic.

2) From Site No. 1 to the dam, local traffic on County Road No. 380 would be controlled either by signing or flagging if necessary during times of heaviest construction.

3) When construction at the dam site was complete, County Road No. 380's gravel would be replenished and regraded where needed, borrow pits would be cleaned and reshaped, damaged culverts would be cleaned and reshaped, and signs or other features repaired.

4) The intersection of County Road No. 380 and Secondary Highway 314 would be evaluated before construction began and monitored during construction to determine adequacy and safety for truck traffic. Measures to accommodate larger trucks would be implemented as required and may include widening of the intersection and moving existing traffic control signs.

5) Signing would be used to advise and warn the traveling public of heavy construction traffic on Secondary Highway 314 and County Road No. 380. All construction signing would be removed upon completion of this proposed action.

6) Speed restrictions of 15 MPH for trucks hauling materials through the residential area of Sheridan, Wyoming would be considered in consultation with area residents and city officials in the event that a rail load-out were used in Sheridan.

7) Dust control along County Road No. 380, in the construction staging area, and in Sheridan, Wyoming (in the event that the Sheridan rail load-out were used), would be conducted when necessary by sprinkling with water or application of a dust palliative such as magnesium chloride.

8) If necessary, hauling major construction materials may be restricted to 7:00 a.m. to 9:00 p.m. to avoid nighttime disturbance of residents in Sheridan, Wyoming and to campground users at the reservoir.

2.3.9.13 Fish and Wildlife Habitat Enhancement Features

The Northern Cheyenne Indian Reserved Water Rights Settlement Act of 1992 allocated $4.6 million for enhancement of fish and wildlife habitat in the Tongue River Basin. The funds are to be used pursuant to P.L. 89-72, with a cost-share arrangement of $3.5 million in federal funds and $1.1 million in state funds. The enhancement features discussed herein apply to either construction alternative and may be implemented regardless of the construction alternative selected. Enhancement planning for the Tongue River Basin Project has been carried out in conjunction with and parallel to other project

planning, project impact mitigation planning, and environmental impact assessment and statement preparation processes. The enhancement planning activity is focused on the improvement of aquatic and terrestrial habitat in the Tongue River Basin and is entirely separate (including funding) from project-related mitigation activities.

The enhancement planning process was initiated with the formation of the Interagency Mitigation and Enhancement Team (Team) and the subsequent compilation of a list of potential enhancement features, concepts, and ideas for projects. The Team is comprised of the project sponsors, DFWP, USFWS, and BIA. Final selection of site-specific projects would be made by the project sponsors with input from the Team.

Biological diversity and ecosystem management were the two main principles guiding enhancement measures. By restoring, protecting, and/or enhancing critical habitat components within the Tongue River Basin via measures such as those discussed herein, the project sponsors would foster biological diversity. Other proposed enhancements address ecosystem management by reintroduction of some species (e.g., bison), eradication of unwanted species (e.g., salt-cedar), and maintenance of healthy biotic communities. For a further discussion of biological diversity and ecosystem management, **see Chapter 3, *Biological Diversity*.**

The enhancement features in this section are presented in a programmatic fashion to illustrate the types of ideas or project components under consideration. As planning for the enhancement features continues, site-specific projects will be identified and evaluated under the appropriate Montana Environmental Policy Act (MEPA)/National Environmental Policy Act (NEPA) compliance process. The enhancement planning process recognized the need for cooperative, educational, and other programs that are not site-specific to allow the project sponsors the latitude to select projects that would be the most beneficial for habitat enhancement as they become evident. For example, as a particular piece of land with high habitat value becomes available for acquisition by purchase or easement, a site-specific project would be developed.

Listed below are the types of projects or programs currently under consideration as enhancement features. Site-specific enhancement measures may include aspects of one or many of the features listed. A description of the listed features is included in **Appendix C**.

1) Acquire lands of high habitat value through purchase or easement to enhance or protect those values.

2) Develop and enhance existing wetland sites.

3) Develop stock pond/small wetlands.

4) Construct wetlands.

5) Enhance aquatic habitat.

6) Enhance riparian habitat.

7) Enhance upland habitat by providing water, shelter belts, dense nesting cover, food plots and sediment control.

8) Enhance instream flows through: 1) a water rights acquisition program; 2) monitoring and enforcement of diversion (possibly via a water commissioner); 3) a streamflow gaging program.

9) Provide fish passage around diversion dams.

10) Screen inlet structures at diversions.

11) Initiate livestock management and exclusion systems.

12) Enhance the Tongue River Reservoir perimeter.

13) Install bird-nesting structures along the Tongue River corridor and reservoir shoreline.

14) Remove trash and car bodies from selected sites.

15) Develop weed control programs.

16) Develop cooperative programs with private landowners and agencies and develop a habitat conservation education program as part of an overall ecosystem management planning activity.

17) Provide short grass/native prairie ecosystem management/enhancement on the Northern

Cheyenne Reservation including prairie dog reestablishment in plague-affected areas on the reservation, and a bison restoration program.

2.3.10 Alternative 2 Roller-Compacted Concrete (RCC) Spillway

The project sponsors considered an RCC alternative because it was cost-effective and achieved project goals. RCC is considered a cost-effective alternative because it uses lesser amounts of expensive materials and is less labor-intensive to place. RCC uses less cement than structural concrete and thus has less strength. This is acceptable because it is used only to cap the earthen dam and protect it from erosion. The RCC cap would serve neither as the primary structure of the dam nor as the primary spillway.

Under this alternative, the existing spillway would be replaced by a new primary spillway in the left abutment made with a reinforced concrete chute at crest elevation 3,428.4 feet (**see Figure 2-13**). The primary spillway would be about 190 feet wide at the crest, tapering to about 100 feet at the toe of the dam. A stilling basin would sit at its base (**see Figure 2-14**).

In addition to the primary spillway, an RCC spillway would be built over the modified dam embankment (**see Figure 2-15**). The RCC spillway would have two components: a secondary spillway at elevation 3,429.4 feet and an emergency spillway at elevation 3,431.4 feet. The three spillways would be built at different elevations, with the primary at the lowest and the emergency at the highest. The three spillways together would accommodate the combined 100,000 cfs spillway design flood. A comparison of spillway performance at different flood events is shown on **Figure 2-5.** Final design would determine the ultimate specifications of these spillways.

This alternative changes the traditional understanding of how a dam functions; the RCC portion acts as both the dam for lower runoff (normal operation) and as a spillway during flood flow. Floods up to a 100-year event would be routed over the left abutment primary spillway and possibly the RCC secondary spillway constructed over the dam embankment. Runoff events larger than the 100-year flood would use the RCC emergency spillway in addition to the primary spillway and the RCC secondary spillway.

The secondary and emergency spillways would discharge to the stilling basin at the toe of the dam. From the stilling basin, discharge would flow across the floodplain. The primary spillway would discharge water to the channel downstream in a manner similar to the existing spillway. The downstream flood stages could be 0.4 foot higher than the existing condition, or 10.8 feet deep. The average floodplain width would be about 387 feet or about equal to the existing average floodplain width of 361 feet.

The proposed 4-foot increase in reservoir elevation from 3,424.4 to 3,428.4 feet would increase the reservoir's capacity from 67,000 af to 80,000 af. The reservoir surface area at the spillway elevation would increase approximately 400 acres from 3,198 to 3,612 acres (**see Figure 2-4**).

2.3.10.1 Primary Spillway

Depending on its condition, the existing spillway would either be removed or rehabilitated. A narrower, reinforced concrete chute spillway would be constructed along the existing spillway centerline as shown in **Figure 2-13**. The new spillway would have an improved spillway chute to avoid the standing waves that affect the performance of the existing spillway. The spillway would include a crest section at elevation 3,428.4 feet.

Portions of the existing dam crest would remain in place and would not be covered by RCC. During the 100,000 cfs spillway design flood, 4 feet of freeboard (space) would remain between the reservoir water surface and the dam crest elevation to prevent overtopping by wave action.

Under the RCC alternative, two stilling basins would be built; one at the toe of the primary spillway and one at the toe of the RCC spillways. The primary stilling basin would be 90 feet long and 100 feet wide.

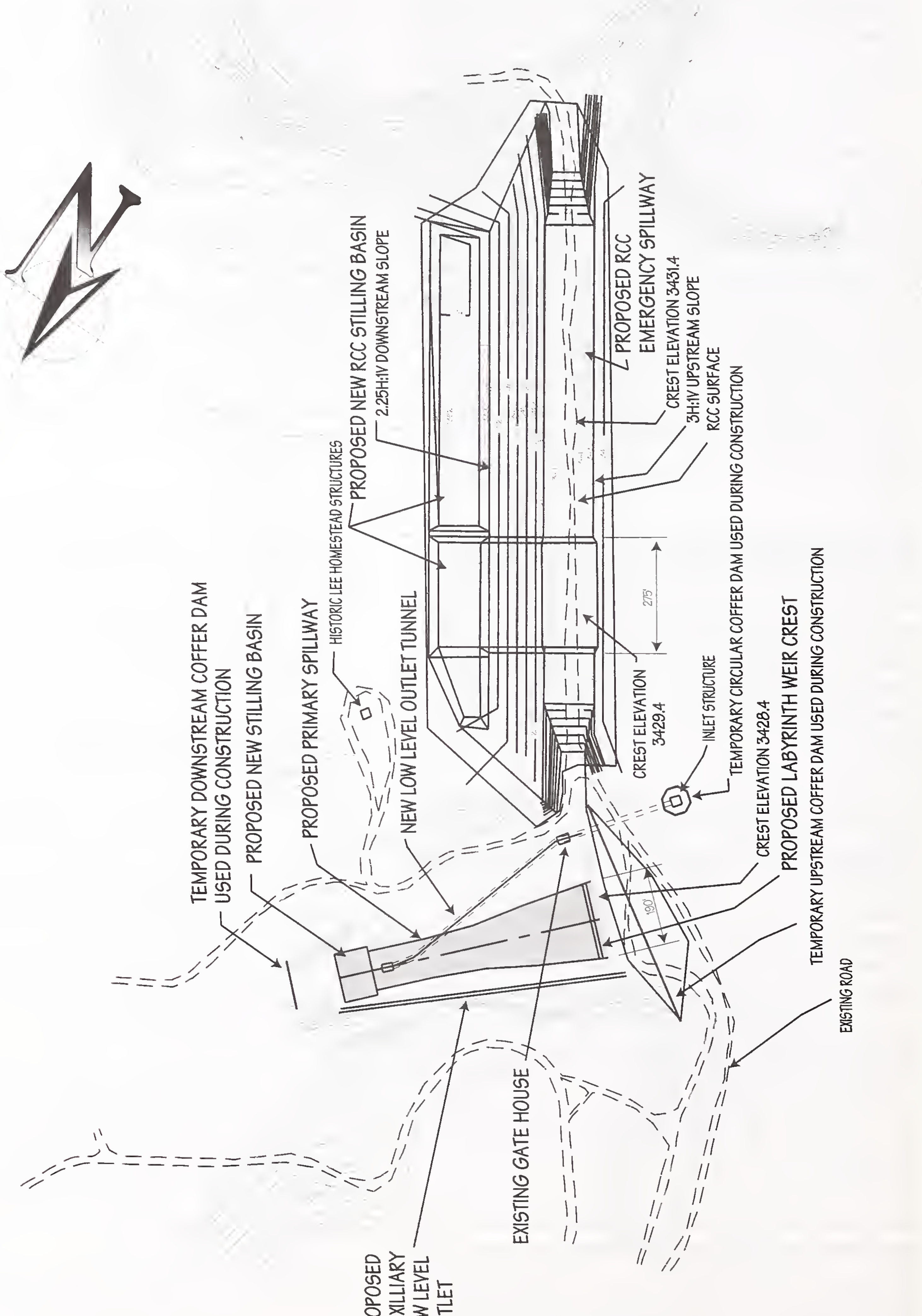


Figure 2-13. RCC Spillway Site Plan

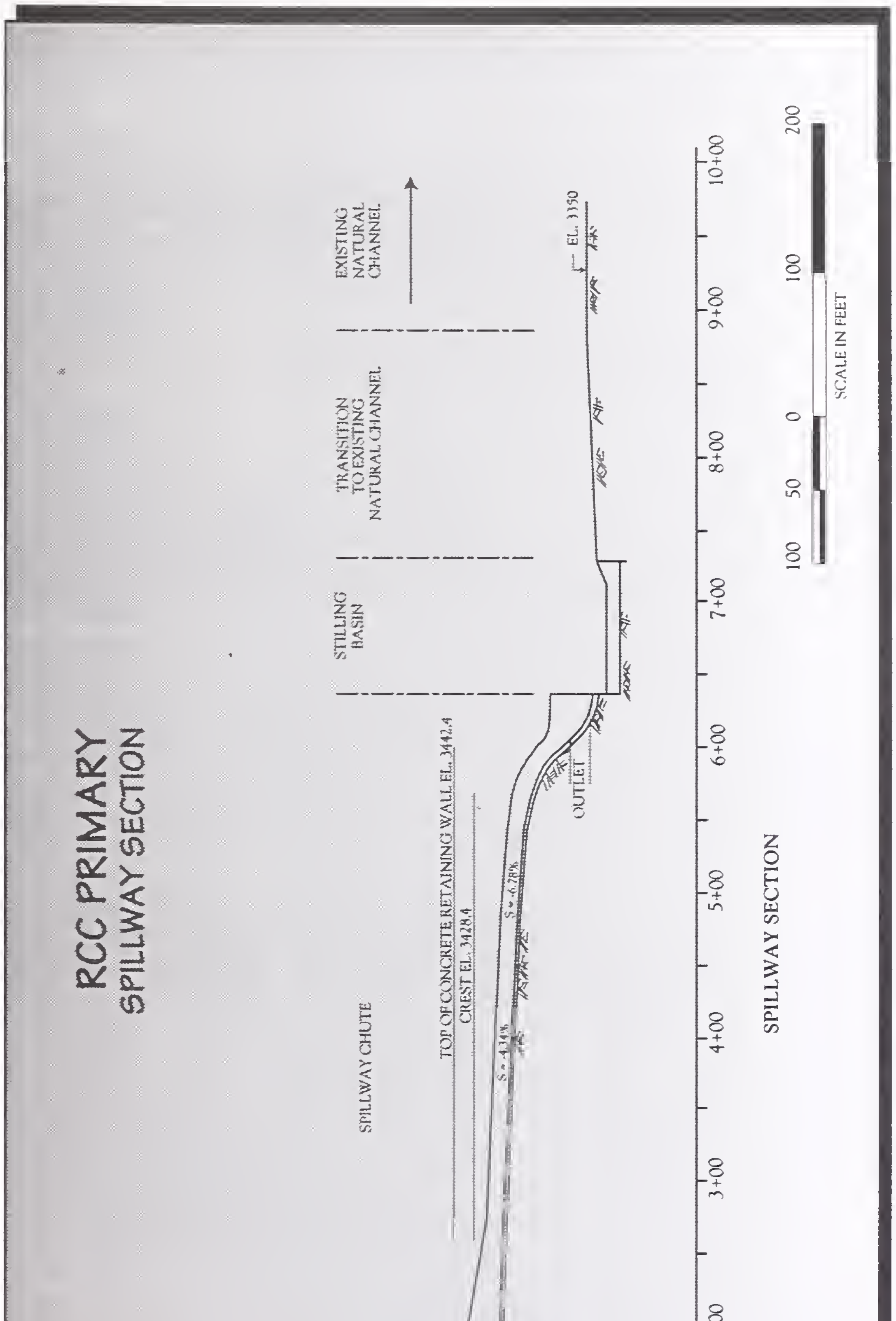


Figure 2-14. RCC Primary Spillway Section

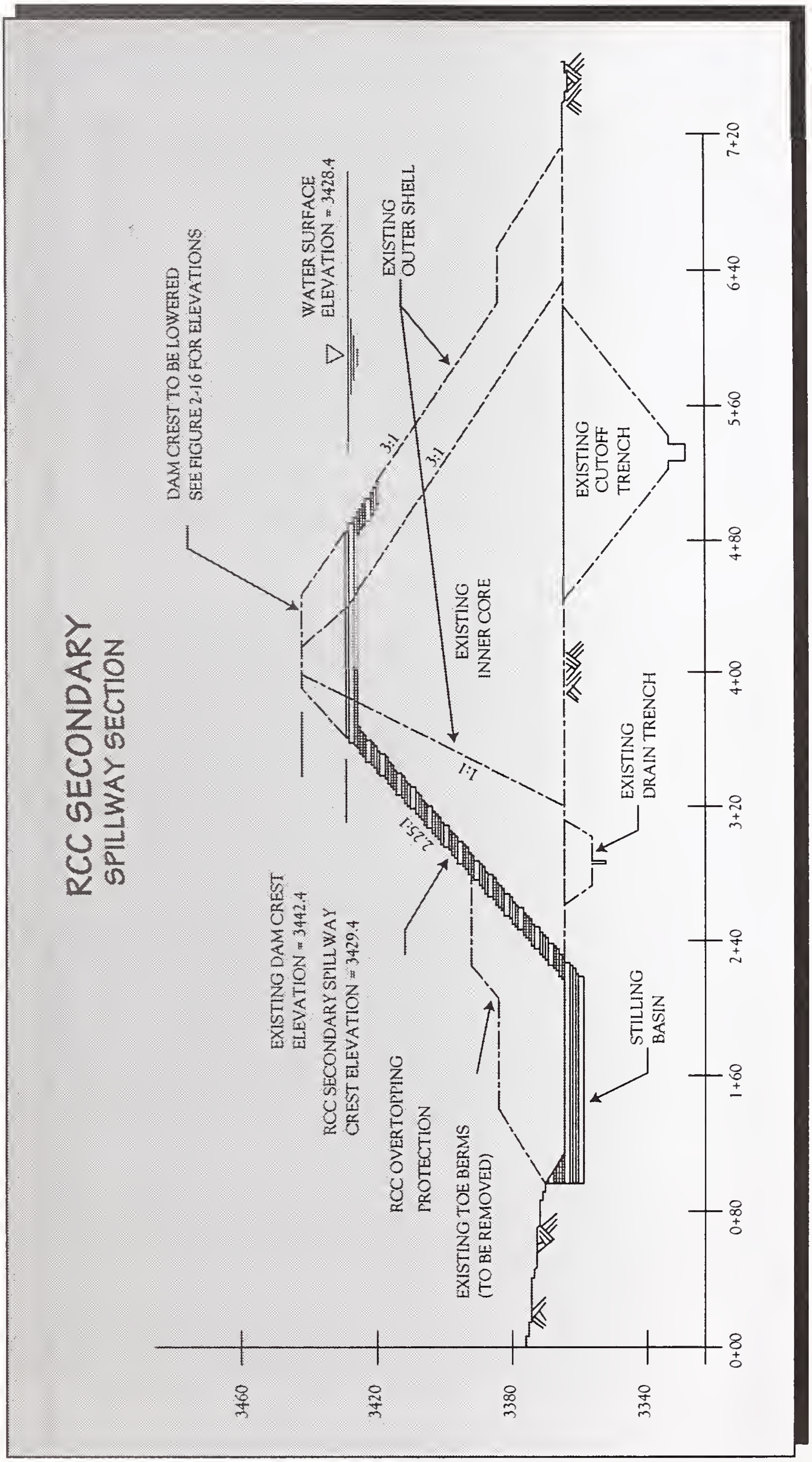


Figure 2-15. RCC Secondary Section

The bottom would be about 15 feet below the natural stream channel. Construction of the primary stilling basin could require passage of water from the outlet works through a flume. This temporary flume may bypass the stilling basin and discharge downstream of a coffer dam (**see *Coffer Dams***). The stilling basin area also would have to be dewatered during construction because of groundwater's proximity to the surface. This would be done the same as discussed under ***Alternative 1***.

2.3.10.2 RCC Spillways

The combined RCC spillways (secondary and emergency) could measure up to 1,200 feet wide at their crest and drop about 90 feet to a stilling basin (**see Figure 2-15**). The secondary spillway would have a minimum crest elevation of 3,429.4 feet. It would be constructed in the middle of the dam embankment as shown in **Figure 2-13**. If scoria was used as an aggregate and produced RCC that needed protection from freeze-thaw conditions, then exposed surfaces of the RCC spillways would be protected with a structural concrete or earthen cap. Scoria is a lightweight aggregate susceptible to freeze/thaw damage. Scoria is more subject to erosion and more porous than aggregate available at Site No. 1, however, it has been used successfully as RCC aggregate on other similar projects.

The crest section of the combined spillways would be level and its ends sloped up to the dam crest to allow vehicular traffic to cross the dam. RCC construction would also produce steps on the spillway face to dissipate energy from water falling swiftly over the chute.

The stilling basin for the RCC spillways would be 100 feet long and up to 1,200 feet wide. The bottom would be about 10 feet below the existing floodplain. No coffer dam would be necessary for construction of this stilling basin because no surface water currently flows directly below this proposed structure. However, the stilling basin construction area would still have to be dewatered.

During flood events, water coming out of the RCC stilling basin could find its own path or be trained (guided) across the existing floodplain. This differs from the labyrinth weir spillway and the primary spillway in that all flood waters would be discharged to the tailrace channel. A tailrace is a channel between the stilling basin and the natural channel of the river (**see Figure 2-8**).

2.3.10.3 Dam Embankment Modifications

Depending on its final width, the RCC overlay probably would require at least partial removal of the toe berms (large steps on the embankment) so that the downstream dam face would provide an unbroken plane for discharge of extremely high flows over the dam crest. These toe berms are made of scoria, and therefore, are a possible source of aggregate for the RCC Spillway. RCC likely would be constructed in 1-foot-high lifts, about 12-feet wide and achieve an overlay thickness of at least 4 feet as shown in **Figure 2-15**.

The existing crest of the dam is 18 feet higher than the current spillway elevation. Under this alternative, the existing elevation of the dam crest could be lowered as much as 13 feet. The difference in elevations between the existing and proposed dam crests would allow the RCC component to be built (**see Figure 2-16**).

2.3.10.4 Rehabilitation of Existing Low Level Outlet Works and Construction of Auxiliary Outlet Works

Under Alternative 2, the proposed improvements to the existing low level outlet works would be similar to Alternative 1 and would include an air shaft to provide sufficient aeration and other hydraulic improvements to prevent erosion that occurs just downstream of the gates (**see Figure 2-17**).

Downstream releases during rehabilitation of the low level outlet works would be made by an auxiliary low level outlet works that could be constructed with a mid-level intake at about elevation 3,380 feet and a capacity of about 600 cfs. The auxiliary low level outlet would provide the following benefits:

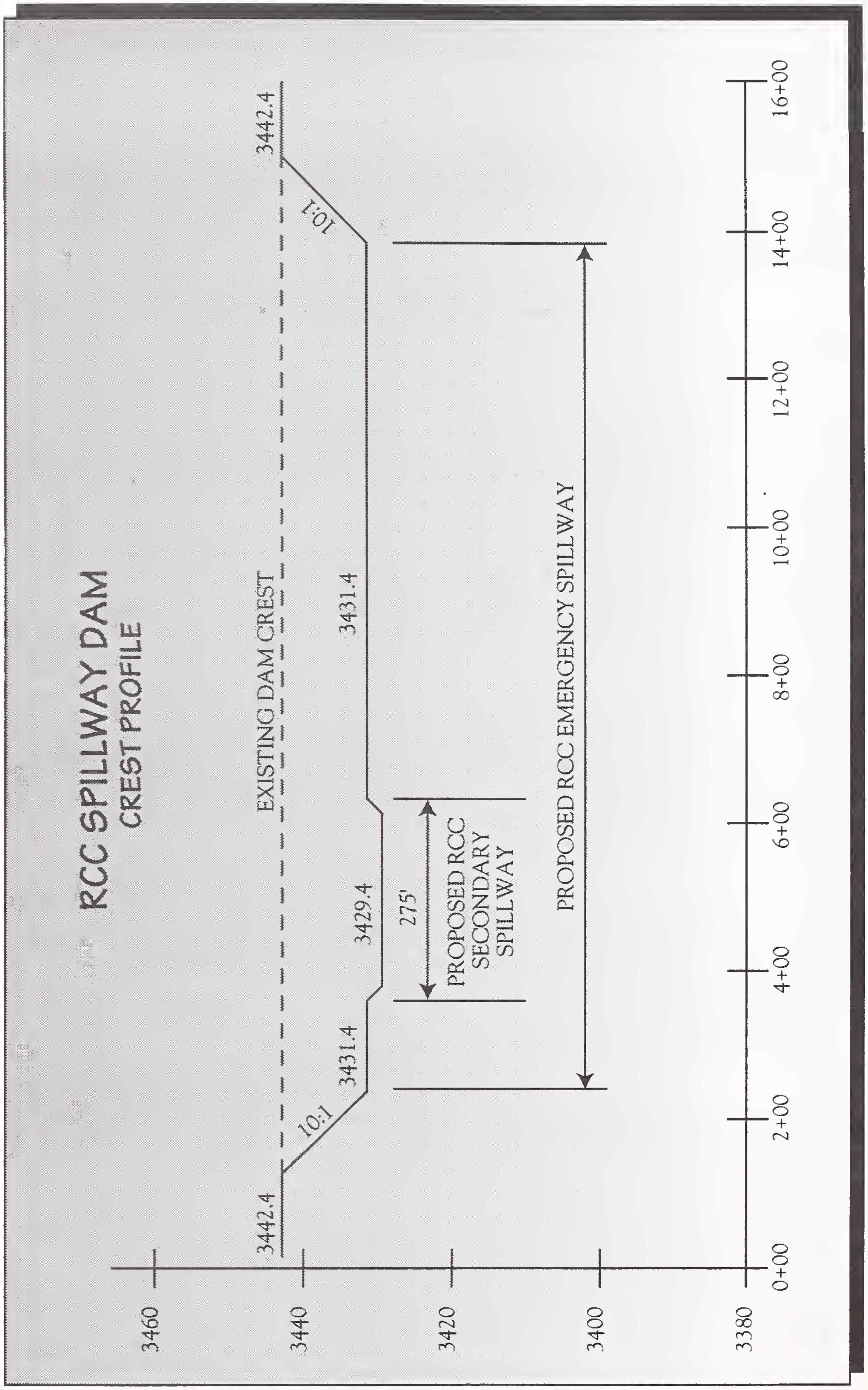


Figure 2-16. RCC Spillway Dam Crest Profile

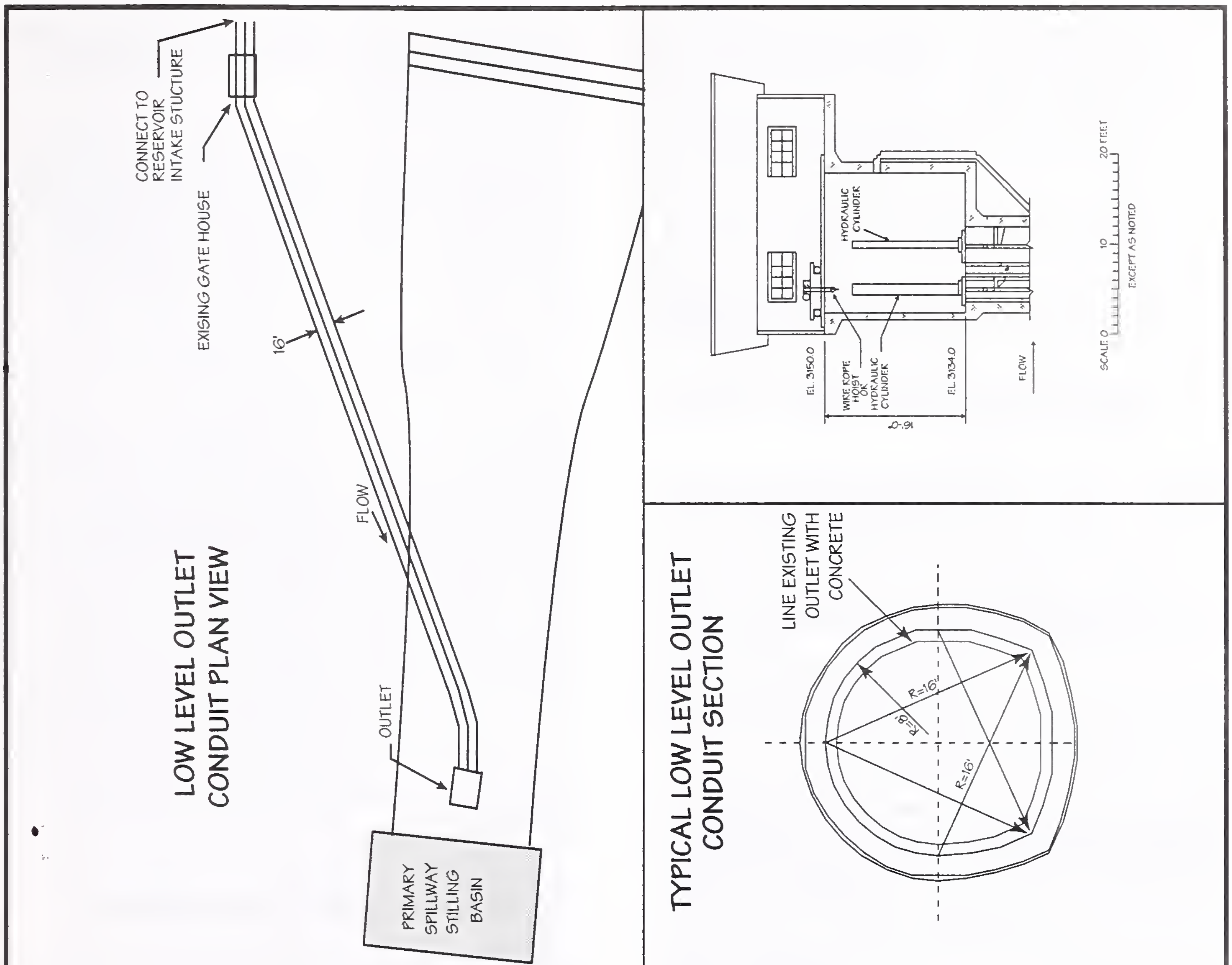


Figure 2-17. RCC Outlet Rehabilitation

- During rehabilitation of the existing low level outlet works, it would allow greater capacity to pass high inflows around the project. It also would allow releases equal to run-of-river flows or if possible 190 cfs to protect downstream fishery and aquatic resources at all times, reducing the risk of overtopping the coffer dams.
- The use of an auxiliary low level outlet works would also result in future benefits. It would allow streamflows to be released during periods when the main outlet was being inspected or repaired and would avoid any impact to downstream fishery and aquatic resources during these periods.

Proposed rehabilitation of the existing outlet would include replacement of the existing 6-foot-wide by 12-foot-high roller gates with new similar sized gates as shown on **Figure 2-17**. The new gates would provide a discharge capacity similar to or less than the capacity of the existing gates. This capacity would be sufficient to reduce the reservoir from full pool to 25 percent of capacity in 25 days or less (USBR reservoir evacuation standards).

The existing downstream outlet conduit has operated successfully for about 55 years and is in serviceable condition. It might require a 12-inch reinforced concrete liner to provide another 50+ years of service but would continue to exit near the downstream toe and centerline of the spillway chute. The need for the liner would be confirmed during the final design phase of the project.

2.3.10.5 Coffer Dams

An upstream coffer dam having a crest elevation of 3,442 feet would be constructed to prevent reservoir water up to a 25-year flood event from entering the spillway construction area. This dam would be up to 20 feet high and 8 to 12 feet wide at the crest and about 100 feet wide at the base. It would extend from the left abutment to the existing dam, about 400 feet long. The difference between the dimensions in the coffer dams (between alternatives) is accounted for in their placement; the RCC coffer dam would be across the throat of the existing spillway approach and the labyrinth weir coffer dam would extend onto the receding floor of the reservoir. The RCC coffer dam would allow the reservoir to store up to 45,000 af of water. A dewatering system also would be required to remove seepage flows from the construction area.

A downstream coffer dam would be placed just beyond the proposed primary stilling basin to allow diversion of streamflows around stilling basin construction. This dam would be relatively small, measuring about 10 feet high and 100 feet long.

In order to rehabilitate the low level outlet works, a cellular coffer dam may be constructed around the inlet structure (**see Figure 2-13**). This coffer dam could be constructed of earthfill or steel sheet piling, or a combination of both. (A cellular coffer dam is totally enclosed to isolate the inlet structure.) Under this alternative, water levels in the reservoir would be drawn down to elevation 3,390.5 feet or 9,000 af. This means that 5,000 to 15,000 af of water would have to be released into the river prior to construction. Water releases equaling run-of-river flows or if possible 190 cfs would be maintained in the river in late fall and early winter of 1997-1998. Flows would be provided by an auxiliary outlet to allow the diversion of streamflows around construction.

2.3.10.6 County Road Improvements

County road improvements would be the same as those proposed under Alternative 1.

2.3.10.7 Structure and Shore Erosion Protection

Structure and shore erosion protection measures would be the same as for Alternative 1.

2.3.10.8 New Bridge Access

New bridge access would be the same as discussed under ***Alternative 1***.

2.3.10.9 Construction Staging Area

The construction staging area would be the same as discussed under ***Alternative 1***, except for the following:

- Up to 400,000 cubic yards of soil, rock, and scoria ultimately would be deposited in the waste area as opposed to the 500,000 cubic yards proposed under Alternative 1. About 400,000 cubic yards of materials would be excavated to construct the RCC spillway and the new primary spillway. Approximately 100,000 cubic yards of these materials could be used as aggregate for the RCC emergency spillway depending on their suitability. The remaining 300,000 cubic yards temporarily could be used for the coffer dams or other purposes but eventually would be disposed of in the waste area shown on **Figure 2-8.**

- Aggregate Site No. 2 is composed of the existing dam embankment, toe berms on the dam embankment, and adjacent alluvial valley floor extending north from the construction staging area (**see Figure 2-8**). A berm between Site No. 2 and the river would be provided. The detailed site plan developed during final design would give special attention to sediment control and protection of the adjacent wetlands and riparian vegetation to the north of the embankment and the historic Lee Homestead structures.

  Site No. 2 has been selected by DNRC as a possible source of aggregate for the preparation of RCC. This alternative requires that the two berms at the base of the dam be removed. If the scoria that comprises the toe berm and downstream shell of the dam (Site No. 2) is shown to be suitable for use in RCC, it would be used to the maximum extent possible to keep aggregate hauling from other locations (Site No. 1) to a minimum. The toe berms were included in the construction of the original dam. The scoria may be of sufficient quantity and quality for RCC batching activities. As much as 343,000 cubic yards of material would be removed from the dam crest and downstream toe berm. The existing dam embankment contains an estimated 1,225,000 yards of material. Material suitable for RCC construction would be stockpiled on site and used in the RCC mix. If scoria were found to be unsuitable for RCC, aggregate from downstream alluvium (Site No. 2) and possibly Site No. 1 would need to be trucked to the RCC batching site. Unsuitable materials would be disposed of in a waste area used during the original construction and located downstream of the dam west of the river as shown in **Figure 2-8**. Site No. 2 would be operated from spring to fall of 1997. Site No. 2 would have to be sampled to verify the suitability and amount of aggregate available and its characteristics. Processing the aggregate could require the use of screening for the size distribution required.

2.3.10.10 Railroad Unloading Facilities

Railroad unloading facilities would be the same as discussed under ***Alternative 1.***

2.3.10.11 Water Conservation Option

The water conservation option would be the same as discussed under ***Alternative 1.***

2.3.11 Material Requirements

2.3.11.1 Primary Spillway

Structural Concrete Aggregate and Cement

Construction of the primary spillway would require approximately 13,400 cubic yards of aggregate and 12,100 tons of cement. The aggregate would be provided from Site No. 1, as discussed under Alternative 1 and shown in **Figure 2-4**.

Reinforcing Steel

About 695 tons of reinforcing steel would have to be hauled to the construction staging area in the same manner as that for Alternative 1. The materials would be stockpiled on site for use.

2.3.11.2 RCC Spillway

RCC Aggregate and Cement

Up to 100,000 cubic yards of aggregate and 4,000 tons of cement would be required for the RCC spillway. Site No. 2 shown on **Figure 2-8** would be the primary source of aggregate, if the source is suitable, and could provide sufficient quality for use in batching RCC.

If a structural concrete cover were used to protect the scoria RCC, then an additional 23,200 cubic yards of structural concrete aggregate would be required

from Site No. 1. Six thousand tons of additional cement also would be required.

2.3.11.3 Low Level Outlet Works

Estimated quantities of materials for rehabilitation (including lining) of the low level outlet works include: two sealing gates and hydraulic operators, approximately 1,527 cubic yards of concrete and 78 tons of reinforcing steel.

2.3.11.4 Coffer Dams

Coffer dams would require approximately 23,000 cubic yards of earth fill material from the dam crest. Final design may indicate that steel sheet piling could be required for portions of the coffer dams. If steel sheet piling was necessary, the amount (tons) needed would be identified during final design.

2.3.11.5 County Road Improvements

Material requirements for road improvements related to the RCC alternative are estimated to be the same as proposed under ***Alternative 1***.

2.3.11.6 Structure and Shore Erosion Protection

Material requirements for structure and shore erosion protection are estimated to be the same as proposed under ***Alternative 1***.

2.3.12 Material Hauling

The details of aggregate hauling, such as time-of-year, truck numbers and sequencing, and safety considerations, would be developed during final design. Actual construction sequencing requirements, available staging area, and aggregate production capacity may limit the number of trucks and trip frequency, extending the number of days required to move the necessary tonnage.

Approximately 850 trips would be made to and from the staging area via County Road No. 380, Secondary Highway 314, Secondary Highway 338 and, possibly, Interstate Highway 90 for other construction materials such as reinforcing steel and cement. Materials hauling could be staged strategically over the 4-to-5-month period prior to and including preconstruction project activities such as mobilization and demolition. While a larger network of highways would be impacted by the construction material hauling, the delivery schedules would be planned during final design in a manner to minimize impacts on traffic.

Material hauling associated with rail and truck haul of riprap, county road improvements, and mitigation activities would be the same as for Alternative 1.

2.3.12.1 RCC Spillways

Disposal of the existing spillway materials (see below) and excess excavation required to construct the spillway would require 15,000 round trips between the spillway excavation and the waste area using equipment with a 20-cubic-yard capacity.

Aggregate for the RCC primary spillway would require an estimated 620 round trips by 20-cubic-yard capacity trucks between aggregate source Site No. 1 and the construction staging area. Reinforcing steel would have to be hauled to the construction staging area on County Road No. 380. Assuming 15-ton loads per trip, about 50 trips would be required to transport the reinforcing material to the staging area.

Site No. 2 is immediately adjacent to the staging area and the haul distance would be very short. Assuming 20 cubic yards per trip, approximately 5,000 trips would be required to transport the aggregate materials within the staging area.

2.3.12.2 Low Level Outlet Works

About 185 truckloads of mixed concrete would be transported from the staging area to the outlet works sites by trucks and pumps for the low level outlet works.

2.3.13 Major Construction Activities

2.3.13.1 Reservoir Drawdown and Downstream Releases During Construction

Construction of the RCC spillway alternative would require drawdown of the reservoir for two activities:

- rehabilitation of the low level outlet works and construction of auxiliary outlet works, and
- construction of the new primary spillway.

Preliminary analysis by DNRC indicates that the project may be able to store up to 45,000 af of contract water during construction. The amount stored would depend on the alternative selected, the actual construction schedule, and the risk of acceptable flooding during construction.

Rehabilitation of the low level outlet works would require drawdown of the reservoir to elevation 3,390.5 feet (9,000 af of storage) over a 1-month period in late fall of 1997. The reservoir would be held at elevation 3,390.5 feet until the outlet rehabilitation and the upstream coffer dam were completed in the winter of 1997-1998. The reservoir would then be refilled up to 45,000 af, as streamflows allowed, during the spring of 1998.

During the construction period, a target release of 190 cfs would be maintained through the low level outlet works to reduce impacts to aquatic life and fisheries.

DNRC proposes that downstream agricultural losses during construction would be mitigated the same as discussed under ***Alternative 1*** (i.e., supply run-of-river releases, monitor downstream flows, and storing water for delivery to contract holders).

2.3.14 Overall Construction Schedule

2.3.14.1 Description of Construction Steps

The sequence, estimated time requirements, and scheduling of each construction activity are shown in **Figure 2-18.**

2.3.14.2 Employment Requirements

Tribal hiring preferences would be the same as for Alternative 1.

Preconstruction Employment

Estimated employment required preceding construction would be the same as for Alternative 1, shown on **Table 2-1.**

Construction Employment

Employment requirements during construction would be lower for Alternative 2 than for Alternative 1. Employment requirements are shown on **Table 2-5.** Employment scheduling is shown on **Figure 2-19.**

Mitigation Employment

Employment requirements for mitigation would be the same as for Alternative 1, which are shown on **Table 2-3.**

2.3.15 Probable Construction Cost Estimate

RCC is a cost-effective construction material. The probable construction cost estimate for Alternative 2 is shown in **Table 2-6** and equals $17,660,170 for the dam safety improvements. This cost does not include construction activities associated with the overall project such as the county road improvements, structure and shore erosion protection, mitigation, and enhancement. Including other construction-related costs, total cost estimated for this project would be $28 to $31 million.

TABLE 2-5: Estimated Employment During Construction for Alternative 2

Task	Skilled Labor By Task and Crew Size	Semi-Skilled Labor By Task and Crew Size	Total Employment
Site Work & Reclamation	5	3	8
RCC Placement	5	3	8
Spillway Repair	12	2	14
Outlet Rehabilitation	2	4	6
TOTAL	24	12	36

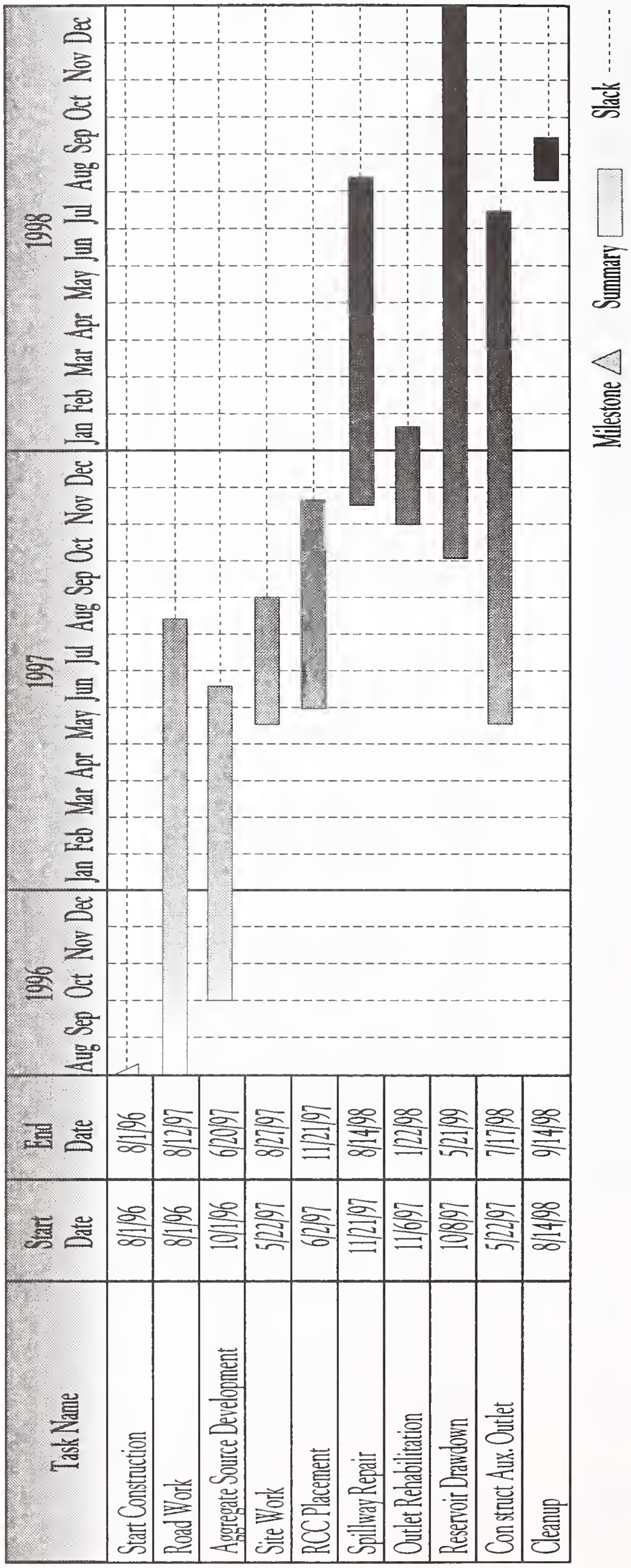


Figure 2-18. Project Timeline for RCC Spillway

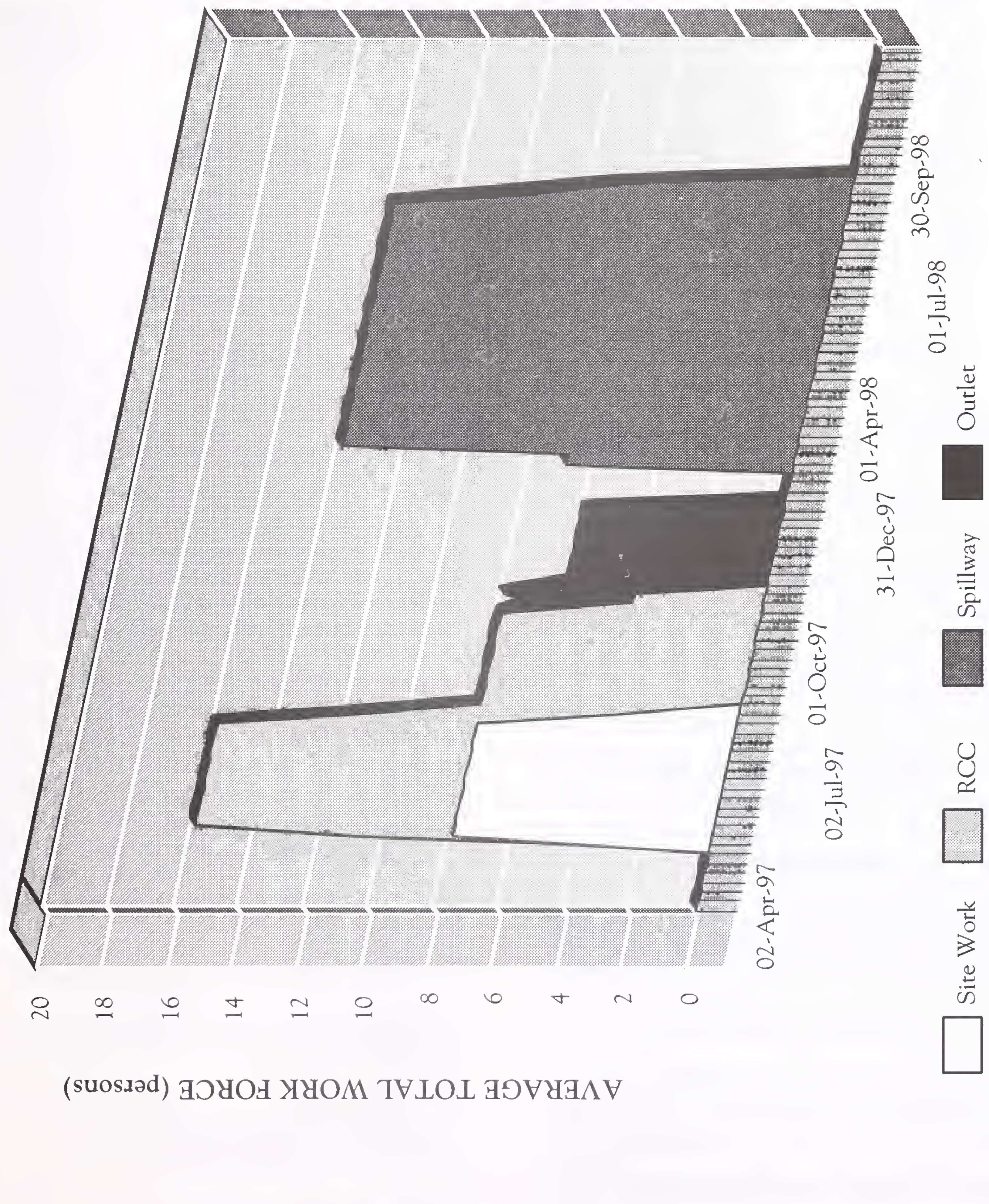


Figure 2-19. Estimated Work Force RCC Alternative

TABLE 2-6: Probable Construction Cost Estimate for RCC Spillway

Description	Quantity	Unit	Unit $	Amount
Mobilization		LS		$716,900
Excavation				
Clay	68,100	cy	5	340,500
Common Earth	274,800	cy	3.5	961,800
RCC	100,000	cy	40	4,000,000
Drain Trench	400	cy	30	12,000
Drain Pipe	6,600	lf	12	79,200
Fill	21,300	cy	8	170,400
Concrete Demolition	4,500	cy	103	463,500
Concrete Slabs	3,900	cy	220	858,000
Concrete Walls	9,500	cy	250	2,375,000
Concrete Crest	900	cy	250	225,000
Cement	12,100	tons	100	1,210,000
Joints	5,900	lf	6	35,400
Reinforcement	695	tons	1,000	695,000
Upstream Coffer Dam	23,000	cy	8	184,000
Downstream Coffer Dam	5,600	cy	5	28,000
Dewatering		LS		100,000
Rehabilitate Outlet Works	1	LS		2,600,000
Auxiliary Outlet Works	1	LS	1,000,000	1,000,000
Subtotal				16,054,700
10% Contingency		LS		1,605,470
TOTAL				**$17,660,170**

Note: LS=lump sum, cy=cubic yards, lf=lineal feet
Note: Final design will determine actual construction costs. The estimates provided herein are for comparative purposes only.

2.3.16 Land Disturbance

Up to 167 acres would be disturbed if the RCC alternative was implemented including 70 acres for aggregate mining, 56 acres for county and campground roads, 5 acres for rail load-out at Sheridan, and up to 36 acres for the construction staging areas.

2.3.17 Facility Monitoring and Reclamation

2.3.17.1 Construction Staging Area

The construction staging area would be monitored and reclaimed similar to Alternative 1.

2.3.17.2 Aggregate Source Site No. 1

Aggregate source Site No. 1 would be monitored and reclaimed similar to Alternative 1.

2.3.17.3 Aggregate Source Site No. 2

The performance of air and water quality protection features would be monitored during construction operations at this site, involving excavation and RCC aggregate extraction. Special attention would be given to downstream wetlands, cottonwoods, and the historic Lee Homestead structures. Necessary repairs and adjustments would be made immediately with curtailment of relevant operations as required.

A portion of Site No. 2 would be part of the completed dam embankment. A potential exists for additional aggregate mining in the floodplain that would necessitate reclamation. This could include filling and recontouring or development of additional wetland/riparian acreage. Reclamation would be in accordance with a reclamation plan developed during final design that reflected requirements of all permits and relevant environmental regulations.

2.3.17.4 Railroad Unloading Facilities

Monitoring, and reclamation of these facilities would be similar to Alternative 1.

2.3.18 Proposed Mitigations and Monitoring

Proposed mitigations and monitoring would be the same as discussed under ***Alternative 1.***

2.3.19 Fish and Wildlife Habitat Enhancement Features

Proposed fish and wildlife habitat enhancement features would be the same as discussed under ***Alternative 1***.

2.3.20 Alternative 3 No Action

Analysis of Alternative 3, the no-action alternative, is required by MEPA and NEPA. Under this alternative, repairs to Tongue River Dam would not take place. This alternative assumes the worst case scenario; dam repairs would not be guaranteed without federal involvement. The environmental, social, and economic conditions described in **Chapter 3** would not be affected by the construction and operation of the project. Therefore, the no-action alternative provides a baseline for estimating the effects of other alternatives.

The COE has classified the state-owned Tongue River Dam as **unsafe** due to inadequate spillway capacity, and **high hazard** because of the potential for loss of life should the dam fail. DNRC has serious concerns about the hydraulic and structural adequacy of the spillway even though it has operated the reservoir at a reduced capacity since 1978 (DNRC 1981, 1991). Loss of the spillway could lead to loss of the dam itself. If the dam should fail, people and property in the Tongue River Valley below the dam would be at risk. Dam failure would also mean loss of valuable irrigation, fish and wildlife, and recreation resources. Satisfaction of water contracts as described in **Chapter 3** would no longer be possible. Under the no-action alternative, failure of the spillway and the associated effects are considered likely to occur.

The Northern Cheyenne Tribe currently does not have sufficient water to satisfy the Tribal water right recognized in the Northern Cheyenne-Montana Water Rights Compact. Under the no-action alternative, satisfaction of the Tribal water right would not occur as agreed to, voiding the Compact. In addition, protection of Indian trust assets by the federal government would not occur.

An additional purpose of the project is to provide for the conservation, development and enhancement of fish and wildlife resources and habitat in the Tongue River Basin. Under the no-action alternative, these benefits to wildlife would not occur.

In addition, the impacts of either of the construction alternatives would not occur. Status quo would be maintained in the natural environment unless or until the spillway failed, at which time effects would occur. The economic benefits associated with construction employment and increased irrigation water also would not take place (**see Chapter 4, *Economic Conditions***).

2.4 Alternatives Considered But Dismissed

A number of alternatives have been determined by the project sponsors to be infeasible, unreasonable, or did not meet the purposes of the project. The alternatives discussed in this section were evaluated and have been dismissed from further consideration. The reasons for dismissal are described in the following sections.

Project sponsor evaluations used as the basis for dismissing these alternatives are contained in *Special Report; Tongue River Dam Rehabilitation* (Northern Cheyenne Tribe, DNRC, and USBR 1992), *Tongue River Dam Study Planning Report and Preliminary Environmental Review* (USBR 1985), and *The Tongue River Dam Rehabilitation Project* (DNRC 1981). In addition, a compendium of all dismissed alternatives and reasons for their dismissal has been compiled and is on file at DNRC entitled *Alternatives Considered but Dismissed from Inclusion in the Tongue River Basin Project Draft EIS.* The following discussion is summarized from that compendium.

2.4.1 Maintaining Current Dam Operations and Purchasing Water for the Settlement Act With the Northern Cheyenne Tribe From Willing Sellers

Under this alternative, the dam would not be repaired. Existing dam operations would continue

and water needed to satisfy the Settlement Act with the Tribe would be purchased from Tongue River water users. Potential sellers include holders of Tongue River water rights and water contracts. Ranching operations that sold their water rights or water contracts would have difficulty sustaining their operations. This alternative would temporarily provide additional water to the Tribe but would not address repair of the unsafe dam.

This alternative was dropped because it did not satisfy dam safety concerns. Impacts resulting from dam failure would be unacceptable. If the dam failed, this alternative would provide only temporary additional water to the Tribe.

2.4.2 Breaching the Dam and Constructing a New Dam Downstream to Provide Water for the Settlement Act

Under this alternative, the dam would be breached and a new dam constructed on the Tongue River downstream. The new dam would have to be large enough to supply water to satisfy all existing contracts (40,000 afy), and up to an additional 20,000 afy of water to the Tribe as stipulated in the Settlement Act. DNRC has examined a number of other potential dam sites on the river. Of these sites, the Post Creek and High Tongue sites showed the greatest potential.

Because of the high cost of building new dams at either the Post Creek or High Tongue sites ($230-300 million), this alternative was dropped. The costs of breaching the existing dam also would be incurred under this alternative. There would be cumulative environmental effects from both construction of a new dam and breaching of the existing dam.

2.4.3 Breaching the Dam and Purchasing Water for the Settlement Act From Willing Sellers

Under this alternative, the Tongue River Dam would be breached, draining the reservoir and resulting in a loss of water storage. Water for the Settlement Act would be supplied by purchasing Tongue River water rights from willing sellers.

While breaching the dam would eliminate safety concerns, it would also have major adverse environmental, economic, and social impacts. All current project benefits would be lost, including those for irrigation, reservoir recreation, fish and wildlife, and basin flood control.

Though it might be possible to purchase water rights to satisfy a portion of the water committed to the Tribe, without a reservoir it likely will not be possible to secure enough water. Purchasing water rights would necessitate the further retirement of irrigated lands outside of the reservation boundaries. For these reasons, this alternative was dismissed from further study.

2.4.4 Draining the Reservoir, Mining the Coal Underneath, Repairing/Enlarging the Dam, Refilling the Reservoir, and Using the Money Generated by the Coal Mining to Pay for the Dam Repair

Under this alternative, the dam would be repaired and raised, but coal deposits underneath the reservoir would be mined before the reservoir was refilled. Money generated by coal mining would be used for dam repair and enlargement costs. It has been estimated that about 47,700,000 tons of recoverable coal could be mined from lands currently submerged by the reservoir (DNRC 1981).

This alternative would involve mining on an alluvial valley floor. Therefore, certain assurances regarding the maintenance and reestablishment of existing hydrology would have to be demonstrated before a mining permit could be issued. In addition, a large gated spillway would be needed to control reservoir water levels during mining. Building the gated spillway is estimated to increase construction costs substantially. Revenues from water sales would be reduced or lost during the 10 to 20 years required for mining.

The alternative was dismissed because of the excessive amount of time it would take for mining

and subsequent dam repair; because during mining, water to downstream users would be severely limited; because the storage component of the Tribal water right could not be satisfied by 1997 as stated in the Water Rights Compact; and finally, because project costs would increase by $77 to $108 million while coal mining would bring in only an additional $9 million.

2.4.5 Repairing the Dam and Developing Additional On-stream Storage to Provide Water for the Settlement Act

Under this alterative, the dam would be repaired and additional water for the Tribe would be supplied by building another dam (with a firm annual yield of at least 13,000 afy) on the Tongue River downstream. The two dam sites that have been considered are the High Tongue and the Post Creek sites. The alternative also would allow for the coal under the existing reservoir to be mined.

As discussed in **Section 2.4.2**, building new dams is expensive, and also causes substantial new environmental impacts. Although the downstream dam embankment required under this alternative would be scaled down from those discussed in **Section 2.4.2**, the spillway (which comprises a large portion of the cost of a dam) would need to be of similar capacity to the existing dam. Further, the Tongue River Dam would still need to be repaired under this alternative. It is unlikely that coal mining the floor of the existing reservoir would be sufficient to offset the comparatively high costs of building a dam at the High Tongue or Post Creek sites.

2.4.6 Repairing the Dam and Developing Off-stream Storage to Provide Water for the Settlement Act

Under this alternative, the dam would be repaired to existing capacity and other off-stream storage facilities would be developed to supply additional water to the Tribe. This alternative would satisfy dam safety concerns.

Off-stream storage was considered in the form of two small reservoirs on Pumpkin Creek (a tributary to the Tongue) and filling abandoned pits at the Decker Coal mines. The additional storage of about 7,600 af at Pumpkin Creek (firm annual yield would be considerably less) would not satisfy the water volume required by the Settlement Act (i.e. approximately 13,000 af required in addition to unallocated Tongue River Reservoir storage). The coal mine pits were determined to be an unacceptable solution because of concerns about suitable water quality, the legal need to reclaim coal mines and the inability to store sufficient water to meet the Settlement Act. This alternative was dismissed for the reasons discussed above.

Off-stream storage also would be from three to six times more expensive than the $5 million incremental cost of raising the spillway crest elevation four feet (costs of environmental mitigation would be about the same as raising the spillway).

2.4.7 Repairing the Dam and Obtaining Water for the Settlement Act From Another Watershed

Under this alternative, the dam would be repaired, and additional water for the Tribe would be imported from another watershed. Stored water from Big Horn Reservoir on the Big Horn River, or Yellowstone River water, would be pumped through a pipeline to the Tongue River.

A pipeline from either source would be about 60 miles long. The pipeline would have to be buried along a corridor, disturbing about 730 acres. This alternative was dropped because the costs of importing water would be prohibitive (approximately $2.7 million per mile for the pipeline alone), especially when added to the costs of repairing the dam. The alternative also may have environmental costs that would exceed those of the other alternatives being considered.

2.4.8 Repairing the Dam and Giving the Tribe a Cash Settlement

Under this alternative, the dam would be repaired to existing capacity. No additional water would be

supplied to the Tribe; instead the Tribe would be given a cash settlement.

This alternative would satisfy dam safety concerns because of the dam repair. It was dropped because a cash settlement would not provide the additional storage stipulated in the Settlement Act (i.e. approximately 13,000 af required in addition to unallocated Tongue River Reservoir storage), which is part of federal trust responsibility.

2.4.9 Repairing the Dam and Obtaining Water for the Settlement Act From Bedrock Aquifers

Under this alternative, the dam would be repaired to existing capacity and bedrock aquifers would be pumped to supply the additional water for the Tribe (i.e. approximately 13,000 af required in addition to unallocated Tongue River Reservoir storage). Repairing the dam would satisfy dam safety concerns. However, bedrock groundwater resources under and in the vicinity of the Northern Cheyenne Indian Reservation were not found to be a viable alternative for satisfying the Settlement Act.

While there is some potential for extracting large amounts of water from local bedrock aquifers, there are also many restrictions. Expected well yields are variable, much of the groundwater is marginally suitable or unsuitable for irrigation and human consumption; drilling and pumping costs are high; and pumping these aquifers could reduce surface water flows and regional aquifer levels. For these reasons, this alternative was dismissed.

2.4.10 Repairing the Dam and Obtaining Water for the Settlement Act From Alluvial Groundwater

Under this alternative, the dam would be repaired to existing capacity and additional water for the Tribe (i.e. approximately 13,000 af required in addition to unallocated Tongue River Reservoir storage) would be provided by pumping alluvial groundwater from the Tongue River Valley in the vicinity of the reservation. Storage in the aquifer far exceeds the amount of water moving through it and groundwater in the alluvium is connected to the Tongue River. Hence, large withdrawals of groundwater would cause the water table to decline. That, in turn, would remove water from the river by diminishing or eliminating base flow or reducing recharge. A decline in the water table could also cause adverse effects to riparian plant communities along the river. For these reasons the alternative was dropped from further consideration.

2.4.11 Repairing the Dam and Obtaining Water for the Settlement Act by Purchasing Water Rights and Contracts

Under this alternative, the dam would be repaired and the State of Montana through DNRC, would purchase water rights from water users to satisfy requirements of the Settlement Act. The alternative was dropped because no water right holders and so few water contract holders expressed any interest in selling when surveyed by DNRC (Economic Consultants Northwest 1994).

2.4.12 Two-Phased Construction

Under this alternative, the project sponsors would repair the dam to present capacity and then raise the spillway later when Tribal water uses were better known. Consideration of this alternative was urged by an EPA comment on the draft EIS, primarily as a means of avoiding immediate impacts to jurisdictional wetlands around the reservoir. This alternative was suggested before the Tribe identified the present and reasonably foreseeable use of their Compact water. Tribal interpretation of the Compact, stipulating project completion as of December 31, 1997, requires that water be available for their use on that date. Two-phased construction would not allow for such delivery.

Two-phased construction also would cause more environmental impacts (related to another reservoir drawdown being necessary), and would involve technical difficulties as described in **Appendix H**. Further, jurisdictional wetlands around the reservoir would not be impacted by the four-foot raise in

reservoir elevation required to satisfy the Compact water right (**see Section 4.8.1**).

The present cost of simply raising the spillway crest elevation at Tongue River Dam has been estimated at approximately $5 million. If this activity were performed independently in the future, additional costs would be incurred for such things as mobilization of construction crews, required reclamation of areas disturbed by construction activities, and any additional mitigation that would be required. In total, these costs could amount to $10-20 million, over and above the cost of rehabilitating the dam at present.

2.4.13 Repairing the Dam and Raising the Spillway, But Operating the Reservoir at Pre-1978 Capacity (Present Design Capacity) Until the Tribe Specifies Water Uses

Under this alternative, the project sponsors would repair the dam and raise the spillway, but would operate the reservoir at pre-1978 capacity (present design capacity) until the Tribe specifies water uses. This alternative also was suggested by an EPA comment, primarily as a means of avoiding immediate impacts to jurisdictional wetlands around the reservoir, and was dismissed for the following reasons. The Tribe has now identified the present and reasonably foreseeable use of its Compact water. Tribal interpretation of the Compact, stipulating project completion as of December 31, 1997, requires that water be available for their use on that date. Marina and campground facilities would have to be moved to accommodate potential higher water levels, increasing the distance between the facilities and the normal reservoir pool. County Road No. 380 also would have to be moved and improved even if the reservoir were not filled.

Also, it would be difficult to hold the reservoir at pre-1978 capacity in a river basin that produces more than four times the capacity of the proposed reservoir. Further, jurisdictional wetlands around the reservoir would not be impacted by the four-foot raise in reservoir elevation required to satisfy the Compact water right (**see Section 4.8.1**).

2.5 REASONABLY FORESEEABLE ACTIVITIES

This section discusses reasonably foreseeable activities proposed for location near the project area. Reasonably foreseeable activities are those that have been proposed in specific enough detail to allow evaluation at this time. Evaluation of reasonably foreseeable activities is undertaken to determine whether any of the activities proposed would have an impact on the Tongue River Basin Project or whether there would be significant cumulative impacts when considering the projects together with the Tongue River Basin Project. Although not all reasonably foreseeable projects discussed in the EIS lie within the Tongue River drainage, their implementation could result in cumulative impacts with the Tongue River Basin Project.

2.5.1 Tongue River Railroad

The Tongue River Railroad Company (TRRC) has applied to the Interstate Commerce Commission for authority to construct and operate a 41-mile rail line from a point south of Ashland, Montana, to a connection with operating coal mines near Decker, Montana. The proposed rail line would serve as an extension to TRRC's approved, but yet to be built, 89-mile rail line from Miles City to Ashland.

The preferred alternative route generally would parallel the Tongue River (**see Figure 2-20**). The purpose of the new rail line would be to transport low sulfur, subbituminous coal from mines in southeastern Montana and northern Wyoming to electric utilities, primarily in the midwestern states. The line would be single track with a right-of-way averaging 200 feet wide. The alignment would be designed to facilitate the operation of unit coal trains with about 115 cars at a design speed of 40 to 50 MPH.

Depending on its proximity to the Tongue River, construction and operation of the preferred alignment could have significant impacts on the river's aquatic ecology. The most significant impacts

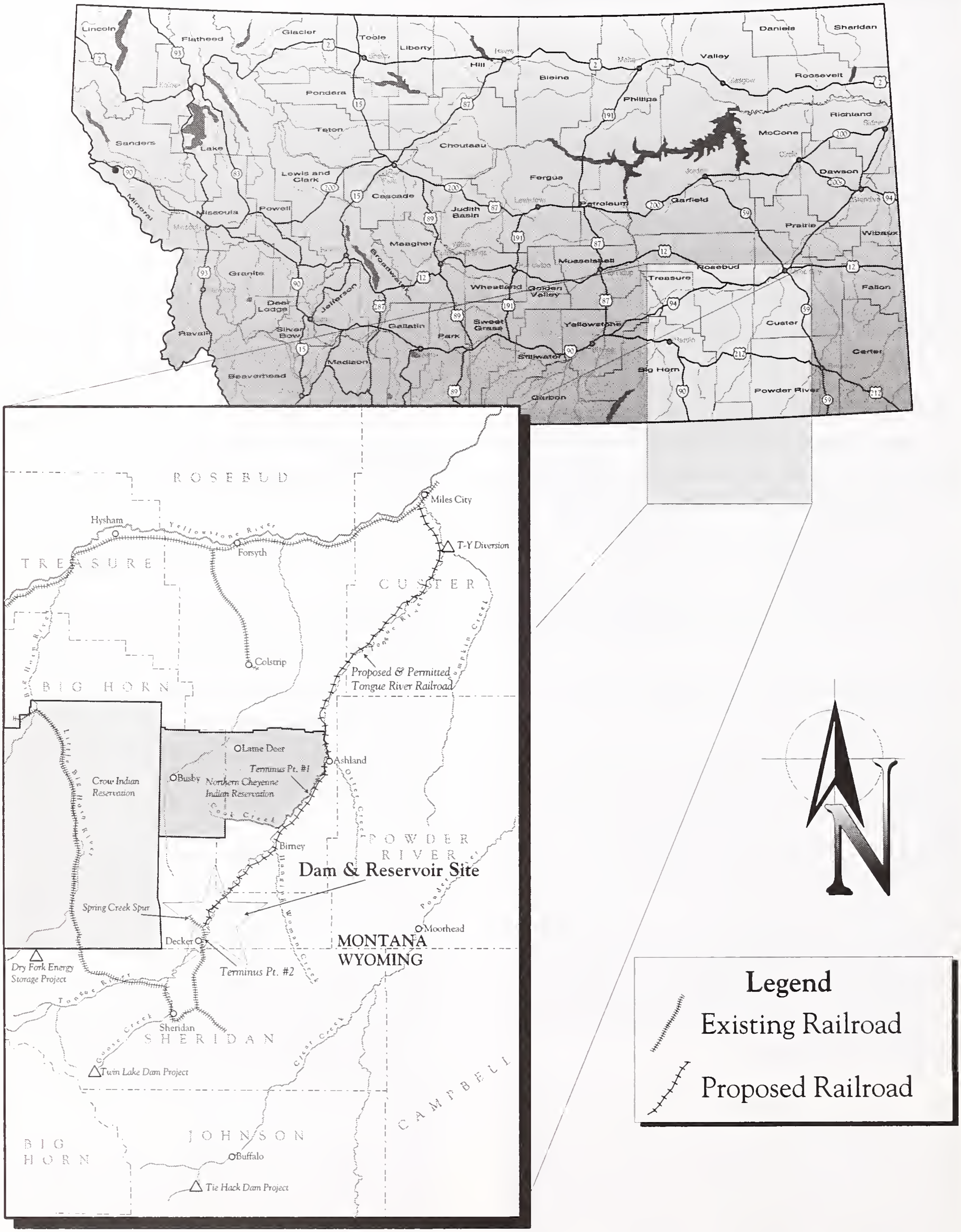


Figure 2-20. Proposed Tongue River Railroad Alignment

to the river are expected to occur along the narrow 10-mile river valley extending from the Tongue River Dam north to the confluence with Four Mile Creek. Five bridges and a tunnel have been proposed along this 10-mile stretch. This section of river is considered to be the most sensitive and vulnerable to potential negative impacts from the proposed rail line because of topography and important habitat for waterfowl and wildlife.

The area along the proposed route is sparsely populated and dedicated primarily to cattle ranching. Construction and operation of the line would alter the character of the landscape for the duration of the line's operation. Ranchers are concerned that cattle operations may be disrupted, grazing lands bisected, fire hazards increased, noxious weeds introduced, and land productivity and values reduced.

Since much of the right-of-way would be fenced, operation of the line could act as a barrier to some wildlife movement. Some access to sport fishing along the river may be lost. Some wetlands may be lost.

Testimony from several Tribal members indicated that construction and operation of the proposed rail line may permanently disturb or destroy certain aspects of the traditional way of life on the Reservation. Also, the Tribal government has suggested that the rail line would stimulate increased regional coal mining, bringing increasing negative pressures on the Tribe's resources and well-being without guaranteeing any positive benefits.

Although construction and operation of the proposed line may bring increased economic benefits, there may be associated negative social and economic costs, particularly during construction when large, temporary construction crews may strain the area's social and economic resources.

A number of concerns were raised about the structural integrity of Tongue River Dam if blasting was employed to build the rail line. TRRC states that blasting would not be employed if seismic analysis determined that blasting would pose a risk to the dam.

Discussions with staff at the Interstate Commerce Commission indicate that construction of the rail line likely would be delayed by administrative requirements and legal appeals by the public until after the rehabilitation of the Tongue River Dam was completed (Dana White, Interstate Commerce Commission, personal communication, October 31, 1994).

2.5.2 State Highway Improvements

The Montana Department of Transportation (MDT) plans to begin the following three rehabilitation projects in the area during 1996-1997:

- Camps Pass - East on U.S. Highway 212 beginning at milepost 76.9 (about 14.8 miles east of Ashland) and extending easterly to milepost 84.7. The estimated construction cost is approximately $9.8 million.
- Lame Deer - East on U.S. Highway 212 beginning at milepost 42.2 (in Lame Deer) and extending easterly to milepost 54.3. The estimated construction cost is approximately $11.5 million.
- Otter - North and South on Secondary Highway 484 beginning at milepost 20.0 (about 20 miles south of U.S. Highway 212) and extending southerly to milepost 27.8. The estimated construction cost is approximately $7.8 million.

2.5.3 Twin Lakes Dam (City of Sheridan, Wyoming)

The information contained in this section is taken from the *Twin Lakes Reservoir Enlargement and Rehabilitation Project Environmental Assessment (1992).* The Sheridan Area Water Supply Joint Powers Board proposes to enlarge and rehabilitate the dam and facilities at Twin Lakes. The Twin Lakes site is about 22 miles southwest of the City of Sheridan, Wyoming, about 50 miles southwest of the proposed project (**see Figure 1-1**).

The Twin Lakes Project would provide an area-wide water supply for the city of Sheridan and surrounding areas. Project components include construction of a

treatment plant and distribution system and the enlargement and rehabilitation component. The latter component would have consisted of constructing a single dam combining Twin Lakes Nos. 1 and 2 reservoirs into a single reservoir. To accomplish this, both dams would have been raised and joined.

A construction workforce of about 30 people would be needed in years 1 and 2. The construction workforce is expected to be one-third local hires and two-thirds immigrant workers. A temporary work camp is proposed on National Forest System lands in northwest Wyoming for immigrant workers.

The project has been delayed due to a lack of receipt of a 404 permit from the COE. The permit has been withheld primarily due to remaining concerns about impacts to existing wetlands in the area. As a result, the proposal has been modified to reduce the size of the reservoir to contain 3,400 af of water rather than the 4,600 originally proposed. In addition, some dam embankment redesign has been included. The embankment design has been modified to raise only dam No. 1. This will reduce the acreage of wetlands that will be impacted. The complete project has an estimated cost of $60 million. Of this total, the dam is expected to cost $15.5 million.

The project sponsors expect to have all necessary permits in hand by April, 1996. If so, construction could begin in the summer of 1996 and could be completed by late 1997. Although this schedule overlaps with the Tongue River spillway rehabilitation schedule, little labor impact is expected due to the Tribal hiring preference (under TERO) required for the Tongue River Basin Project. Some service and supply industries may be impacted by concurrent construction.

2.5.4 Tie Hack Dam (City of Buffalo, Wyoming)

The city of Buffalo, Wyoming proposes to construct a dam and reservoir on National Forest System lands about 12 miles southwest of Buffalo. Buffalo is about 35 miles southeast of Sheridan, Wyoming and about 65 miles south of Tongue River Dam. The proposed Tie Hack Dam would be located on South Clear Creek about 1,600 feet downstream from the confluence with Sourdough Creek (**see Figure 1-1**). The proposed dam would be constructed of roller-compacted concrete.

The Tie Hack Reservoir would impound 2,425 af of water and form a reservoir of 63 acres. Arms of the reservoir would extend about 0.5 mile up the valleys of South Clear and Sourdough creeks. The reservoir would supply municipal, fisheries, and hydropower demands (John Almand, U.S. Forest Service, personal communication, February 16, 1995).

The existing access road to the Tie Hack Campground would be inundated by the reservoir. Access to the dam during construction, and to the proposed boat ramp and parking area after completion of the project, would be via a new road branching from the existing access road about 1,000 feet uphill from the Johnson County Youth Camp.

A boat ramp, parking area, and new campground would be located just west of the dam. The boat ramp would be capable of handling small nonmotorized boats. Fishing, nonmotorized boating, and swimming would be allowed at the reservoir. A new 10-to-20-unit campground would be built for recreational vehicles. All recreational facilities would be administered by the Big Horn National Forest, Buffalo Ranger District.

A 400-square-foot hydropower generation facility would be constructed by the City of Buffalo if the project was built.

A 3-year construction schedule is proposed, most likely beginning in spring 1996 and ending in September, 1998. The construction season is expected to be from June 15 to November 1. Labor requirements would vary for each of the three construction seasons, with the greatest amount of labor needed during the first and second years. About 40 people would be employed during the first year, 40 in the second year, and 20 in the third. Because of the complex nature of constructing an RCC dam, a construction contractor would likely bring its own skilled workers to Buffalo to construct the project. Local subcontractors would likely be used for tasks such as road construction and removal of vegetation in the reservoir pool area. No construction camp is proposed. Nonresident

workers would seek housing or trailer sites in Buffalo.

Cost to develop a dam and reservoir at the Tie Hack site is estimated at $10.5 million. Funding would be provided by a grant and loan from the Wyoming Water Development Commission. The loan would be repaid by the City of Buffalo.

2.5.5 Dry Fork Energy Storage Project

A private joint venture proposes to build an energy storage project in the northeastern edge of the Big Horn National Forest in Sheridan County, Wyoming. The project site is about 33 miles northwest of Sheridan, about 40 miles southwest of Tongue River Dam (**see Figure 1-1**).

The purpose of the energy storage project is to supply energy during peak demand periods (Dry Fork Energy Storage Project No date). Water is released from an upper reservoir, usually on top of a mountain, plunges down a shaft, and passes through turbine generators. The electricity generated is then fed into the region's electrical distribution system. The released water is then temporarily stored in a lower reservoir. During off-peak periods, the turbines are reversed to act as pumps, sending the water back to the upper reservoir where it will be ready for use again when the next peak demand occurs. The proposed system can handle as many as 20 peak cycles per day.

Project features include four turbine-generator sets, transformer galleries, a tailrace, and power shaft. This equipment and its installation would be located 0.5 mile below ground surface.

Initially, the upper reservoir would be filled with water from Dry Fork Creek. Thereafter, the plant would operate with a closed-cycle, moving the same water between its upper and lower reservoirs. A total of 1,700 afy of water would be required to replace the water lost due to evaporation and seepage.

An EIS is proposed for this project. A permit for the project must be obtained from the Federal Energy Regulatory Commission.

The project is estimated to cost $1.2 billion and be built over a 4-year period. Employment is estimated at 250 workers in the first year, and 400 workers in the fourth year. Job preference would be given to local applicants. After project completion, about 50 permanent jobs would be created.

A recent announcement by project sponsors indicates that the project has been put on hold.

2.5.6 State Park Improvements

DNRC and DFWP propose a program of recreational mitigations at Tongue River State Park during the construction and reclamation phases of the project (**see *Recreation Mitigation***). DFWP proposes to conduct an additional and separately funded program of planned park improvements. These improvements are described below and presented in **Figure 2-12**, along with the mitigations previously discussed under ***Recreation Mitigation***.

1) About 14,400 linear feet of new or relocated roads may be built.

2) A secondary 150-foot by 16-foot boat ramp may be built at PeeWee Point to relieve congestion at Campers Point.

3) A new fish cleaning station may be constructed at Campers Point to accommodate angler use and comply with state and local health codes.

4) One dump station may be constructed at Campers Point to accommodate RV needs and meet state and local health codes.

5) Ten full-service campsites may be developed at Campers Point.

6) About 10,000 square feet of boat trailer storage may be provided at Campers Point to reduce congestion problems at and near the boat ramp and concession building.

7) Three potable water wells may be drilled and maintained -- one each at Rattlesnake, PeeWee, and Sand points.

8) A drip irrigation system may be constructed in the areas where vegetation has been reestablished along the new shoreline.

9) About 600 feet of 5-foot wide sidewalk may be developed in primary association with latrines, boating facilities, concession building, and shelters.

10) Six handicapped parking spaces may be developed to serve the park's handicapped guests.

11) Twenty single-post signs may be placed throughout the park facility.

12) Ten double-post signs may be placed throughout the park facility.

13) One sliding dock and one floating dock may be built at Campers Point to accommodate future recreational requirements.

14) Between 24-48 boat slips are being considered for the Campers Point area for marina operation and public use.

DFWP's park plan improvements may be implemented during the construction and reclamation phases of the project.

2.6 COMPARISON OF ALTERNATIVES

Table 2-7 presents a summary of impact topic by alternative and resource area for Alternatives 1 and 2. Impact statements contained in **Table 2-7** are described in quantitative and more detailed terms in **Chapter 4**. **Tables 2-8 and 2-9** provide additional comparisons of alternatives 1 and 2 by project components and construction mileage requirements. Alternative 3 (no action) is not included since impacts would be negligible without the project, except in the case of dam failure.

2.6.1 Summary of Impacts Under the Construction Alternatives

Impacts of the two construction alternatives, as summarized in **Table 2-7**, are similar with the exception of the following:

Hydrology

Peak outflow under Alternative 1 would increase over existing conditions. There would be no appreciable change in peak discharges from design floods under Alternative 2.

Vegetation

Increased flood flows associated with Alternative 1 could favor maintenance of downstream riparian communities while Alternative 2 would approximate existing conditions. The excavation of aggregate for construction would destroy up to 60 acres of vegetation under Alternative 1 and up to 70 acres of vegetation under Alternative 2.

Aggregate Material Sources

Alternative 1 would require the mining of aggregate at Site No. 1 while Alternative 2 could require sites 1 and 2 to be mined.

Construction Employment

Employment required during the construction of Alternative 1 would be slightly higher than for Alternative 2. Wages and salaries are estimated at \$1.9 million for Alternative 1 and \$1.7 million for Alternative 2.

Appearance

Alternative 1 would differ in appearance from the existing spillway due to its zigzag crest. Alternative 2 would have a different dam embankment profile than the existing dam due to the secondary and emergency spillways.

Project Cost

Alternative 1 is estimated to cost approximately 45 percent more than Alternative 2.

2.6.2 Alternative 3 (No Action)

Except in the case of dam failure, the selection of Alternative 3 would result in negligible impacts for all topics and resource areas. Under Alternative 3, the dam would continue to have an unacceptable risk of failure. Dam failure would result in moderate to major and significant impacts to hydrology, social and economic conditions, and recreation. Dam failure would pose a threat to human life, and property. Economic losses from dam failure are estimated at \$300-\$500 million dollars (PRC Engineering 1986) and resulting damage to fish and wildlife habitat could take up to 40 years to fully recover (USBR 1985).

TABLE 2-7: Summary of Impacts by Construction Alternative and Resource[1]

Impact Topic	Construction Alternatives
Air Quality	
Impacts on air quality from project construction and operation	Impacts from construction and wind erosion of exposed mudflats during drawdown; effects negligible to minor in the short term and negligible in the long term
Geotechnical Stability	
Impacts on factors of safety relating to the dam embankment	Factors of safety for construction range from 2-2.8; effects negligible in the short and long terms
Soils	
Impacts to shoreline soils from higher water levels in the reservoir	Newly exposed shoreline would erode until stable beach slope is reached; 7.1 miles of shoreline rated moderate - high erosion potential
Impacts to prime and unique agricultural land from higher water levels in the reservoir	41 acres of "prime if irrigated" lands would be affected; effects minor in the short and long terms
Impacts to soil productivity in project-related surface disturbance areas (especially aggregate mines and staging areas)	Productivity could be affected on up to 167 acres; effects moderate to major in the short term and minor in the long term
Impacts on soils from relocation of the State Park	Effects minor in the short and long terms
Hydrology	
Impacts on reservoir elevations and storage from proposed reservoir operation	Storage would increase from 67,000 to 80,000 af; effects major and significant in the short term and major, beneficial and significant in the long term
Short-term impacts to downstream releases during construction	June peak releases would be about 200 cfs more than historic; July-August releases would be about 120 cfs less than historic; effects moderate in the short term
Long-term impacts to downstream releases following construction (with full Tribal development)	June peak releases would be about 200 cfs more than historic; releases would be slightly lower the rest of the year; effects moderate in the long term
Impacts on reservoir ice from increased reservoir water levels	Effects minor in the short and long terms
Impacts on upstream river ice from increased reservoir water levels	Effects minor to moderate in the short term and minor in the long term
Short-term impacts on coal mine pits from decreased reservoir water levels during construction	Decreased seepage into mine pits; effects minor to moderate and beneficial in the short term
Long-term impacts on coal mine pits from increased reservoir water levels	Seepage rate would increase from 200 gpm at south end up to 3,000 gpm for future pits at north extension; effects negligible in the long term
Impacts of increased mine pit discharges on reservoir and downstream water quality	Discharge would range as high as 3,740 gpm and TDS could average 1,825 mg/l, raising average TDS of flows into reservoir from 440-460 mg/l; effects negligible in the short and long terms

Impact Topic	Construction Alternatives
***Hydrology** continued*	
Short-term impacts on shallow groundwater from decreased instream flows during construction	Change in recharge from river to groundwater would be negligible to minor
Long-term impacts to groundwater from increased reservoir water levels	Change in groundwater elevations would be negligible
Impacts to groundwater quality from increased reservoir water levels	Effects would be minor in the short-term and negligible in the long-term
Short-term impacts to reservoir and downstream water quality from construction	Turbidity would increase during construction; effects minor to moderate
Impacts from project-related reductions in Tongue River inflows to the Yellowstone River and the resultant increase in arsenic concentrations	Tongue River contributes only 3 percent of flows to the Yellowstone River at Miles City; TDS in Tongue River inflows into Yellowstone average about 490 mg/l; arsenic in Yellowstone would increase to 11 ug/l (state standard = 18 ug/l); effects negligible in the short and long terms
Downstream impacts of the 100-year flood	Flood peaks would increase from 10,249 to 18,928 cfs for Labyrinth Weir, 11,135 cfs for RCC; effects moderate to major and significant in the short and long terms
Long term loss of reservoir storage due to sedimentation	Natural sedimentation would not increase; effects minor in the long term
Wetlands	
Impacts on wetland acreage from increased inundation	314 acres inundated; effects negligible in the long term because of mitigation and natural regeneration
Aquatics/Fisheries	
Impacts of construction-related drawdown and reduced pool capacity on reservoir fisheries	Fish concentrated; higher predation; greater mortality from outlet works; turbidity and sedimentation; effects minor to moderate in the short term and negligible to minor in the long term
Short-term impacts of reduced downstream releases on river aquatic life during construction	Possible lower flows would cause minor effects in the lower reach of the river and minor to moderate effects immediately below the dam
Long-term impacts of postconstruction reservoir operations on reservoir and downstream aquatic life	Increased reservoir volume and downstream river stability would be beneficial to fisheries; effects minor to moderate and beneficial in the long term
Wildlife	
Impacts on terrestrial species from increased reservoir water levels	227 acres of riparian habitat would be flooded (some acres lost permanently); 139 acres of grassland permanently lost; 25 acres of scrub forest permanently lost; effects moderate to major and significant in the short term and minor in the long term
Impacts on waterfowl from increased reservoir water levels	Drawdown would decrease waterfowl habitat in the short term; effects would be minor in the short term and negligible in the long term
Impacts on threatened and endangered species	The bald eagle, peregrine falcon, piping plover, least tern, pallid sturgeon, and black-footed ferret would not be affected by construction or increased reservoir water levels.

TABLE 2-7 *continued*: Summary of Impacts by Construction Alternative and Resource[1]

Impact Topic	Construction Alternatives
Vegetation	
Impacts on vegetation from increased reservoir water levels	Wave action and water saturated soils due to higher water levels would decrease upland species bordering the reservoir; effects moderate in the short and long terms
Impacts on vegetation from project-related road construction	33 acres of native vegetation would be lost to 3 miles of roads; effects minor in the short and long terms because of weed control plan implementation
Impacts on vegetation from state park relocation	23 acres of native vegetation would be impacted; effects minor in the short and long terms
Impacts on vegetation at the construction staging area	36 acres of native vegetation would be lost; effects major in the short-term and minor in the long term because of weed control plan implementation
Impacts on ethnobotanical resources from project activities	None of the 62 plants inventoried are rare or uncommon; effects negligible in the short and long terms
Impacts on downstream and aggregate source Site Nos. 1 and 2 vegetation associated with project construction and operation	60 acres of native vegetation at Site 1 and 10 acres at Site 2 would be lost; effects minor in the short and long terms
Biodiversity	
Impacts of construction on biological diversity from habitat alteration	Effects minor in the short term and minor to moderate and beneficial in the long term
Social Conditions	
Impacts on social conditions from project construction and operation	2 percent employment increase for about 1.5 years would occur for the Tribe; minor beneficial effect in the short term and negligible in the long term
Economic Conditions	
Impacts on employment and personal income from project construction and operation	Wages and salaries for construction would total \$1.7 - 1.9 million; effects minor to moderate and beneficial in the short term and minor in the long term
Impacts on the agricultural economy from project construction and operation	About 4,000 acres of irrigated croplands could be affected by decreased water availability during construction; less than 0.1% of agricultural land in county impacted; effects minor in the short and long terms
Impacts on area coal mining from project construction and operation	Increased water levels would result in more seepage into coal mine pits; effects negligible in the short and long terms
Impacts on public sector fiscal conditions from project construction and operation	Minor in the short term on local government. Significant in the short term on state and federal governments, and potentially significant and beneficial in the long term
Transportation	
Impacts on local roads from project construction and operation	Peak traffic period would occur for 6 weeks in mid-late summer, 1997; effects moderate in the short term and negligible in the long term

Impact Topic	Construction Alternatives
***Transportation** continued*	
Impacts on secondary highways from project construction and operation	Peak traffic same as above; adequate highway capacity could accommodate peak without adversely affecting present service or unduly wearing surface; effects minor in the short term and negligible in the long term
Impacts on off-road travel from project construction and operation	Negligible to minor in the short and long terms
Impacts to railroads from project construction and operation	16-22 car-loads/day of materials would be delivered during construction, about 3 percent of present traffic in area; effects moderate in the short term and negligible in the long term
Recreation	
Impacts to state park access from project construction and operation	About 71,000 visitor-hours lost to access restrictions because of mining at Aggregate Site No. 1 and other project construction activities; effects moderate to major in the short term and negligible in the long term
Long-term impacts to state park recreation opportunity from project activities	Net loss of 26 acres available for camping; effects negligible to minor and beneficial in the long term
Impacts to downstream floating and fishing from project construction and operation	Negligible to minor in the short and long terms
Impacts to recreation experience from project construction and operation	Moderate to major in the short term and negligible to minor in the long term
Short-term impacts to boating opportunities and navigational safety from construction drawdown	About 35,000 boating-hours would be lost during construction; effects moderate in the short term and minor to moderate in the long term
Land Use and Ownership	
Impacts to land use and ownership from project construction and operation	Between 1,000-4,600 acres of private lands would need to be acquired for operations and mitigation (some acreage in easement); effects minor in the short and long terms
Cultural Resources	
Impacts on cultural resources from project construction and operation	8 Euro-American sites and 10 Native American sites affected by higher reservoir water levels and construction; effects moderate in the short and long terms
Noise	
Impacts on road and highway noise levels from construction activity	Levels range from 51-67 dBA; effects minor in the short term
Impacts on the noise levels in the construction staging area from construction activity	Levels range from 75-95 dBA; effects minor in the short term
Impacts to Tongue River State Park noise levels from construction activity	At 200 feet from the roadway, existing levels would increase by 10 dBA or more; effects minor in the short term

TABLE 2-7 *continued:* **Summary of Impacts by Construction Alternative and Resource**[1]

Impact Topic	Construction Alternatives
Noise *continued*	
If a rail load-out at Sheridan were used, impacts on a three-to-four block area from construction	Levels would increase by 7 dBA to 62-67 dBA; effects moderate in the short term and negligible in the long term
Impacts on Decker, Montana	Minor in the short term and negligible in the long term
Visual Resources	
Impact on visual resources from project construction and operation	Moderate in the short term and negligible in the long term
Impacts to appearance of the spillway	Moderate in the short term and negligible in the long term

Note: [1] Qualitative terms are used to describe anticipated magnitude of impacts and, where appropriate, anticipated importance of impacts to the human environment. The terms "major", "moderate", "minor", and "negligible" describe magnitude. "Significant", "potential to become significant", and "insignificant" describe importance. Impacts are assumed to be insignificant unless otherwise identified.

TABLE 2-8: Project Components of Construction Alternatives

	Construction Alternatives
Spillway design flood outflow, cfs	100,000
Maximum reservoir elevation, feet	3,428.4
Maximum reservoir storage, acre-feet	80,000
Maximum reservoir storage during construction, acre-feet[1]	35,000 / 45,000
Minimum reservoir storage during construction, acre-feet	9,000
Coffer dams upstream and downstream	yes
Auxiliary low level outlet works	yes
New Inundation, acres	400
Peak 100-year flood outflow, cfs	18,928 / 11,135
Average downstream floodplain width, feet	487 / 387
Average downstream floodplain depth, feet	13.5 / 10.8
Aggregate Site No. 1 disturbed acres (max)	60
Aggregate Site No. 2 disturbed acres (max)	0 / 10
Staging area disturbed acres (max)	36
County Road No. 380 disturbed, miles	7.5
Tongue River State Park relocated	yes
Tongue River Canyon fishing access site disturbed during construction	yes
Coal mine mitigation required	yes
Structure and shore erosion protection required	yes
Peak employment, persons	26 / 16
Construction cost, million $	27 / 18

Note: [1] Depending on inflows to the reservoir and other safety considerations
[2] Components between alternatives are the same except where differences are separated by a "/" between entries

TABLE 2-9: Comparison of Materials and Mileage Requirements for Construction Alternatives

ALTERNATIVE 1 (LABYRINTH WEIR) / ALTERNATIVE 2 (RCC)[1]

Task	Cubic Yards	Tons	Trips	Mi/Trip	Off-Road Miles	Highway Miles
COUNTY ROAD CONSTRUCTION						
Aggregate from Site No. 1	19,000	35,150	950	4.82	4,579	no
SPILLWAY CONSTRUCTION						
Coffer dams	28,600	52,910	1,430	0.8	1,144	no
Excavation of foundation materials	660,000/340,000	1,221,000/629,000	33,000[2]/17,000[2]	0.8	26,400/13,600	no
Disposal of existing spillway	6,200	11,470	620	0.8	496	no
Structural aggregate from Site No. 1	30,600/14,300	56,610/26,455	1,530/715	9.64	14,749/6,893	no
RCC aggregate from Site No. 1 for base	61,000	112,850	3,050	9.64	29,402	no
Haul mixed RCC aggregate	61,000	112,850	3,050	0.4	1,220	no
Cement		15,400	770	17	13,090	yes
Reinforcing steel		2,300	115	17	1,955	yes
OUTLET CONSTRUCTION						
Structural aggregate from Site No. 2	1,320	2,442	66	9.64	636	no
Cement		515	26	17	438	yes
Reinforcing steel		137	9	17	155	yes
Mixed Concrete from staging to placement	1,320	2,442	220	0.4	88	no
STRUCTURE AND SHORE EROSION PROTECTION						
Haul and place riprap	91,000	168,350	9,100	4.82[3]	43,862	yes
TOTALS			**53,936**		**138,214**	

Note: [1] *Requirements between alternatives are the same except where differences are separated by a "/" between entries*
[2] *Short, internal haul trips*
[3] *Assumes riprap is unloaded at Decker Coal Mine facilities*
Source: Morrison-Maierle 1994; DNRC materials estimate 1994.

CHAPTER 3

EXISTING ENVIRONMENT

3.1 INTRODUCTION

This chapter describes the existing environment of the area that could be affected by the construction alternatives. The next chapter analyzes the impacts on the environment by alternative.

3.2 CLIMATE

The temperature and precipitation characteristics of the Tongue River Basin are typical of a semi-arid climate. The region experiences cool, moist springs, warm, dry summers, and cold, moist winters. Winters are influenced by high pressure, arctic cold air masses from Canada, and by moist air masses from the northern Pacific region. Spring and summer precipitation usually is the result of moist air from the Gulf of Mexico flowing northward and being cooled as it rises across the High Plains.

Precipitation in the region varies considerably from month to month. Mean annual precipitation ranges from approximately 12 inches at the lower elevations (at the dam) to 15 to 16 inches at higher elevations (surrounding hills). About one-half of annual precipitation occurs during the period from April to June. A large portion of this precipitation occurs as thunderstorms. Precipitation data collected from the region have shown late spring and early summer as the wettest period and late summer as the driest period.

Large annual temperature variations are experienced in the region. The mean annual temperature in the region is about 45° Fahrenheit (F). The minimum and maximum temperatures recorded at the Montco meteorological station (about 35 miles northeast of the dam) were -22°F and 102.2°F, respectively. Winds in the region tend to blow from the northwest in the autumn and winter, from the west in the spring, and from the southwest in the summer. Near the Tongue River, winds are influenced by the orientation of the Tongue River Valley. Wind speeds are generally moderate, averaging approximately 6 miles per hour. However, during the passage of weather systems or near thunderstorms, wind speeds can be considerably higher. There are large diurnal (daily) and seasonal changes in mixing heights in the Tongue River region. Mixing height is the above-ground elevation where all air quality constituents are thoroughly mixed. Mixing heights generally are lower in the mornings and much higher in the afternoons. The morning mixing heights increase slightly in the spring, whereas the afternoon mixing heights are lowest in winter and considerably higher in spring and summer. This is an important factor in determining pollutant dispersion rates (Interstate Commerce Commission 1992).

3.3 AIR QUALITY

Air quality conditions in the Tongue River Basin are generally considered good. Higher than normal air pollutant concentrations have occurred around existing coal mines and populated areas. With the exception of Lame Deer, air pollutant levels are well within Montana and federal ambient air quality standards. On August 7, 1987, Lame Deer was designated as a Group I area for PM-10; indicating the area as having the potential to exceed the PM-10 standards. (Total Suspended Particulates [TSP] standards were replaced in 1987 by a standard measuring the 10 micron or smaller suspended particulates [PM-10]). Chemical mass balance of the Lame Deer area indicated airborne road dust as the primary cause of noncompliance with the PM-10 ambient standards.

The remainder of the Tongue River Basin has been designated either as attaining the ambient standards or as non-classified. Background PM-10 measurements made during 1992-93 at the Spring Creek coal mine (about 5 miles west of the project area) have shown an average concentration of 13 micrograms per cubic meter (ug/m^3), as compared to

the Montana and federal standard of 50 ug/m^3 (**see Appendix D**). The maximum PM-10 concentration measured during the 1992-93 period at the Spring Creek background site was 42 ug/m^3, as compared to the Montana and federal standard of 150 ug/m^3.

The majority of the Tongue River Basin is classified as Class II under the federal Prevention of Significant Deterioration (PSD) regulations, allowing for moderate deterioration (**see Appendix D**). The exception is the Class I designation on the Northern Cheyenne Indian Reservation. The Class I designation restricts increases in ambient air pollutant levels to a much smaller increment than the Class II designation.

Existing sources for air pollutants in the Tongue River Basin include various coal strip mines, agricultural operations, wood waste burning and home heating, vehicle traffic on unpaved roads, and wind erosion from exposed areas. Heavy equipment at the coal strip mines are significant sources for gaseous pollutants including sulfur dioxide, nitrogen dioxide, volatile organic compounds, and carbon monoxide. All of the existing sources listed above are sources of TSP and PM-10.

Wind erosion of exposed areas includes roads, summer fallow fields, dry land pastures, exposed areas within the coal strip mines, and the exposed beaches of the Tongue River Reservoir. Some beaches contain silt material washed into the reservoir from precipitation runoff. The silt material is composed of fine particulates that, when exposed to the sun and wind, can dry out and become airborne. Generally these particulates become airborne only during high winds. Once winds diminish or precipitation occurs, wind erosion ceases.

3.4 GEOLOGY

Tongue River and Tongue River Reservoir lie within that portion of the Northern Powder River Basin defined by sedimentary formations deposited during the later portion of the Tertiary period. The Wasatch and Fort Union formations include the sandstones, siltstones, shales, and coal beds that define the area. The Fort Union Formation is divided among the Tongue River, Lebo Shale, and Tullock Members with the Tongue River Member being the predominant unit in the basin.

Dissected terrain, underlain by discontinuous sandstones, siltstones, shales, and coal seams, is found in the Tongue River area and throughout eastern Montana. Geologic structure underlying the project is characterized by a northwest-plunging syncline, or fold in rock layers where the layers dip inward towards an axis. Natural processes of weathering, erosion and sloughing have caused slope failures and rock slides in the vicinity of the reservoir in parts of sections 13, 24 and 25, T8S, and R40E. The Tongue River Dam is located in an area of low seismic risk, having a Unified Building Code classification of one (International Conference of Building Officials 1991).

3.4.1 Mineral Resources

Coal seams of varying thicknesses exist in the vicinity of the Tongue River Reservoir and upstream and downstream in the Tongue River Valley. Locally, some exposed coal seams have burned as a result of natural causes, baking overlying sandstones and shales into a rock called clinker. Recoverable coal reserves under the south end of the reservoir and beneath the valley about 7 miles downstream were estimated to be 128.9 million tons in 1981 (Montana Department of Natural Resources and Conservation [DNRC] 1981). The Decker Coal Company currently operates coal strip mines adjacent to the Tongue River Reservoir.

Gravel resources can be found in the vicinity of the Tongue River Reservoir. Two sites are discussed in **Chapter 2** under the description of alternatives. No known oil and gas resources are recorded in the project area.

3.5 GEOTECHNICAL STABILITY

Geotechnical information was derived from the construction drawings of the dam, previous experience with the dam, and postconstruction records. In 1967, Bechtel Corporation carried out an

exploration program that consisted of seven borings (four in the embankment, one on the right abutment, one on the left abutment, and one near the spillway crest), and surficial mapping of the Tongue River Dam and immediate vicinity (Bechtel Corporation 1969). A laboratory test program was conducted on undisturbed soil samples recovered during drilling and consisted of classification, strength, permeability, and consolidation tests.

3.5.1 Dam Embankment

The existing Tongue River Dam is 91 feet high, 1,824 feet long, with a crest width of 54.5 feet at elevation 3,442.4 feet. The upstream slope is 1V (vertical) on 3H (horizontal) with a 33-foot ± wide berm at elevation 3,384.4 feet. The downstream slope is lV on 2.25H. Waste material is stockpiled at the toe to elevation 3,392.4 feet (**see Figure 2-15**). The stockpiled material has a 40-foot wide berm at elevation 3,392.4 feet and a 60-foot wide berm at elevation 3,384.4 feet.

The upstream face of the dam consists of a layer of waste scoria and sandstone. Borings in 1967 indicated the core of the dam is impervious clay. The middle section downstream of the centerline of the dam consists mostly of sand and gravel. The downstream shell consists of sand, gravel, and scoria.

The materials borrow source is located just upstream of the dam. It does not appear that borrow areas downstream of the dam were developed. Material from excavation required to construct the spillway, embankment foundation, and outlet works was probably used in the embankment, particularly the sand, gravel and scoria. The balance of the excavation was deposited in a waste area below the dam. Data are collected routinely and used to evaluate the condition of the dam embankment.

3.5.2 Foundation Conditions, Seepage, and Drainage

The foundation of the Tongue River Dam embankment as indicated on the 1967 boring logs (Bechtel Corporation 1969) is generally a 50- to 60-foot thick alluvial deposit of medium dense to very dense silts, sands, and gravels that overlies relatively impervious sandstone and siltstone bedrock. Construction drawings show a cutoff trench beneath the impervious section carried to bedrock and a toe drain placed beneath the downstream shell at a depth of about 11 feet below the adjacent foundation.

Past inspections of the downstream face and toe areas have indicated no evidence of seepage exiting from the face of the dam. A marshy area was noted some 500 feet downstream of the toe and is probably caused by seepage through the foundation. A small flow appears in the old river meander channel at the right toe of the dam and reportedly exits from the embankment drain near the toe of the dam. Another minor seep has been located in the first side canyon some 500 to 800 feet downstream from the toe of the dam in the right abutment. This seep currently is being monitored by DNRC. An additional seep has been located in the left abutment of the dam immediately downstream of the existing spillway. This seep, however, had insufficient flows for monitoring during 1994.

3.5.3 Stability

Geotechnical stability of dam embankments generally is measured by factors of safety. A factor of safety in excess of minimum standards is presumed to be safe. Preliminary stability analyses completed by DNRC, January 1, 1994, indicate that the embankment meets or exceeds current stability criteria shown in **Table 3-1**.

TABLE 3-1: Existing Dam Embankment Stability

Loading Condition	Existing Factor of Safety	Minimum Acceptable Factor of Safety
Steady-state seepage Downstream face	2.1	1.5
Steady-state seepage Upstream face	2.8	1.5
Seismic with 0.02g acceleration	2.0	1.1
Rapid Drawdown	2.2	1.3

Source: DNRC 1994.

3.6 SOILS

Soils in the reservoir area are predominantly loams, silty clay loams and silty clays with occasional cobbles and outcrops as inclusions. Numerous loams dominated by the deep, well-drained Haverson Series, and Complexes of the Wibaux series, characterize the reservoir perimeter. The steep ridges and drainageways are characterized by gravelly and cobbly soils and terrace escarpments.

The proposed construction staging area would be located in predominantly gravelly loams of the Clapper-Harvey Complex and loams of the Wibaux Series and Wibaux-Spearman Complex. These units have moderate erosion potential, low shrink-swell potential, and have low corrosivity to concrete. The river floodplain in the vicinity of the construction staging area is characterized by undifferentiated Haverson and Glenberg and Haverson and Lohmiller soils that are frequently flooded.

Various mapping units of the Glenberg, Busby, Havre, Yamac, and Haverson series may be designated prime farmland, if irrigated. Soils of the Glenberg and Haverson series designated as "prime if irrigated" farmland are in scattered locations around the reservoir and are the predominant soils adjacent to the river upstream of the reservoir. There have been no soils of "unique" farmland quality designated in the areas proposed for project activities.

No soils in the immediate study area have been designated as land of "statewide importance". This designation is made by local conservation districts and identifies soils with production potential equal to those of "prime farmland". The mapping units of Cooers loam, Harlem silty clay loam, Kobar silty clay loam, and Yamac loam 2 to 8 percent slopes are located downstream of the reservoir and are considered to be farmland of "statewide importance".

3.7 HYDROLOGY

3.7.1 Surface Water Resources

The Tongue River Basin, including the Tongue River and its tributaries, is the study area for hydrology. The headwaters of the Tongue River are in the Big Horn Mountains of Wyoming. The river flows in a northeasterly direction for approximately 300 miles to its confluence with the Yellowstone River at Miles City, Montana. The Tongue River Dam (**see Figure 1-1**) is located approximately 10 miles downstream of the Montana-Wyoming state line. The multi-purpose reservoir and dam provide water for irrigation, recreation opportunities, and flood protection.

Flows in the Tongue River average 458 cubic feet per second (cfs) above the dam, 442 cfs as gauged just below the dam, and 418 cfs at Miles City, Montana (U.S. Geological Survey [USGS] 1994). Based on 31 years of record, the average annual discharge of the Tongue River just above the dam is 332,000 afy, below the dam is 321,000 afy and 303,000 afy at Miles City, Montana (USGS 1994). Flows at Miles City are lower than dam releases during the May-to-September period when approximately 15,000 acres in the basin are irrigated (Northern Cheyenne Tribe [Tribe], DNRC, and U.S. Bureau of Reclamation [USBR] 1992) (**see figures 3-1 and 3-2**). Flows from October to April are higher at Miles City than dam releases as a result of contributions from river tributaries and absence of irrigation withdrawals (USGS 1994) (**see Figure 3-2**). Flood events and flood flows below Tongue River Dam and dominant discharge (a major component of channel formation) are discussed in **Chapter 4, *Hydrology*** and **Appendix E**.

Existing storage capacity of the reservoir is 67,000 af. The capacity of the reservoir, like all reservoirs, is gradually decreasing due to natural sedimentation. The Tongue River Water Users Association and DNRC operate the Tongue River Reservoir to meet irrigation contracts while maintaining safe storage and flows (Northern Cheyenne Tribe, DNRC, and USBR 1992). As a result of a 1978 flood event that damaged the spillway (**see Figure 3-3**) of Tongue River Dam,

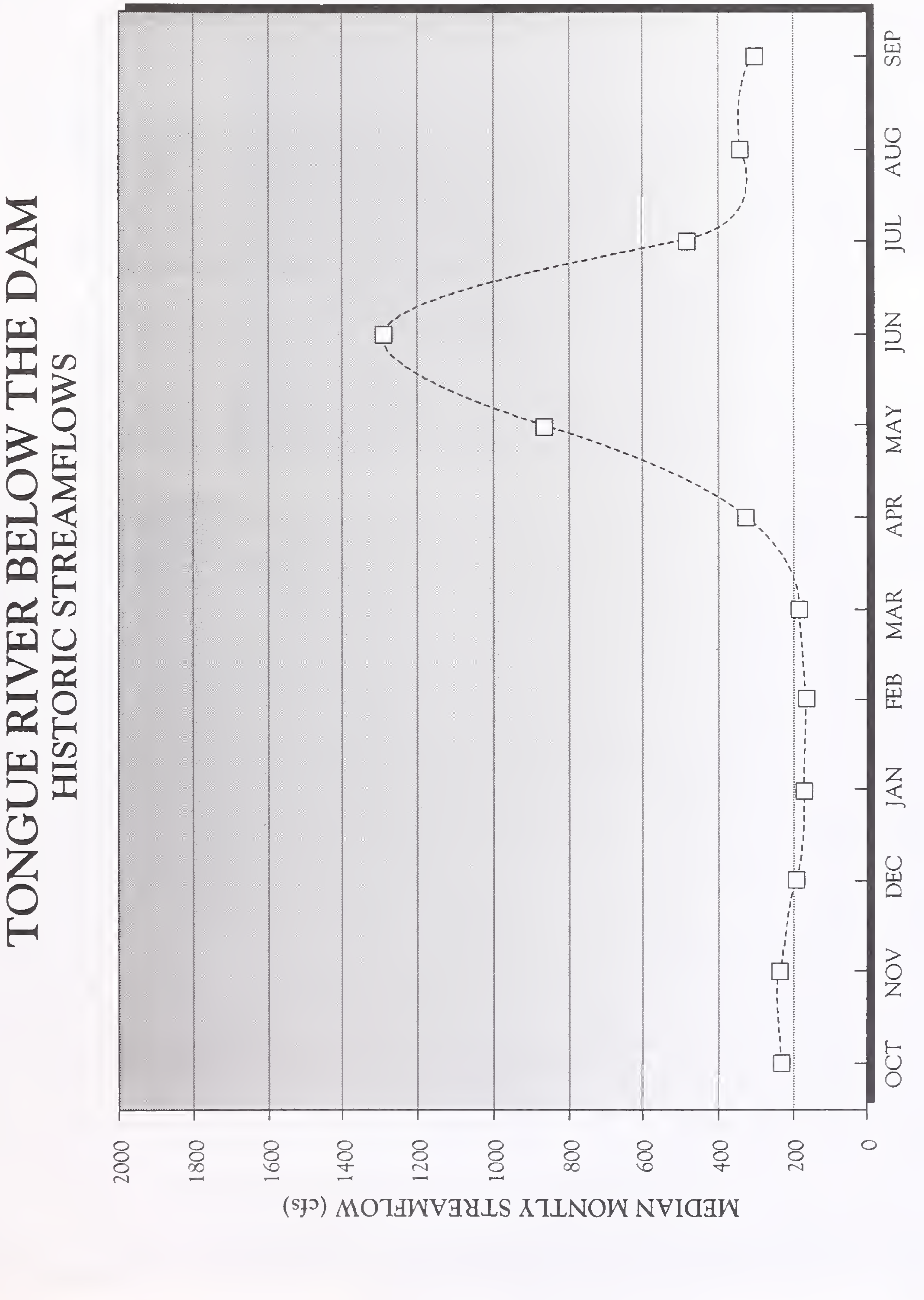


Figure 3-1. Tongue River Below The Dam Historic Streamflows

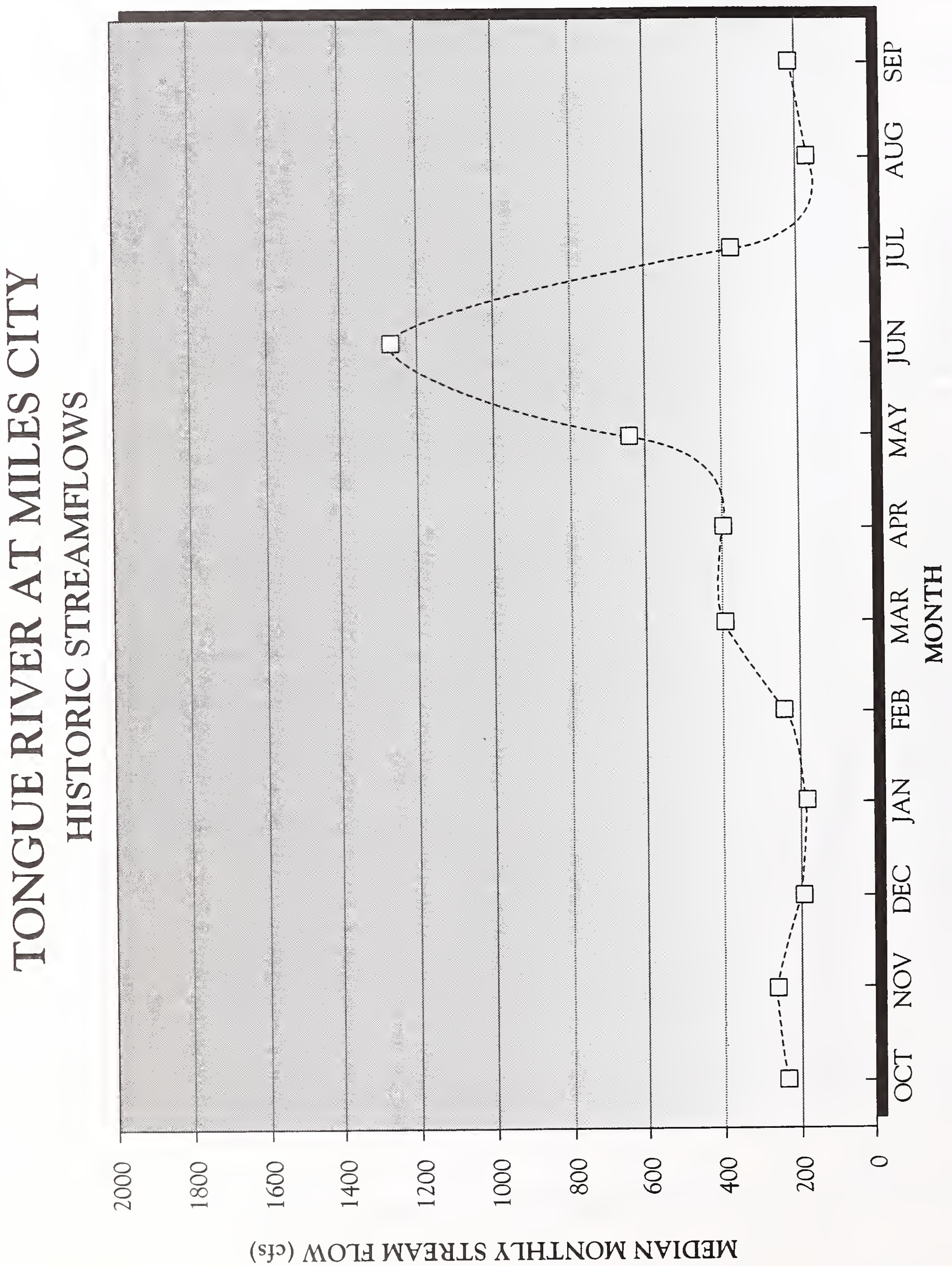


Figure 3-2. Tongue River At Miles City Historic Streamflows

Photo showing closeup view of 1978 flood discharge

Photo showing oblique aerial view of flood discharge

Figure 3-3. 1978 Photographs of Spillway Flood Discharge

attempts are made to hold capacity at 20,000 af during spring runoff. Following the peak of spring runoff, the reservoir is typically allowed to fill to a capacity that is sufficient to meet current water contracts totalling 40,000 afy. Because of high inflows to the reservoir and other naturally occurring hydrologic variables, the reservoir at times fills to a capacity between 50,000 af and 60,000 af, despite attempts to hold it at lower levels. Releases to water users are made on demand with a minimum instream flow of 75 cfs maintained for fish and wildlife through the winter. Based upon monthly evaporation and precipitation data for the Broadus, Montana, weather station (U.S. Department of Agriculture 1974), net annual evaporation from the reservoir is estimated to be about 5,090 afy.

The major tributaries of the Tongue River are Hanging Woman, Otter, and Pumpkin creeks. Numerous minor tributaries drain watersheds of varying sizes. These minor tributaries flow only in response to precipitation, runoff, and snowmelt. Major tributaries generally flow throughout the year but may flow intermittently within certain reaches during a season or a dry year.

3.7.1.1 Surface Water Quality

Water quality in Tongue River meets suitability standards for public and private water supplies, livestock use, and irrigation. Concentrations of sulfate and total dissolved solids (TDS) are the contaminants that most severely threaten the suitability of Tongue River water. Specific electrical conductance (SEC) of water is a method of evaluation that indicates the concentration of ionized minerals or dissolved solids in solution.

Water in Tongue River upstream of the reservoir at the Montana-Wyoming state line has an average sulfate concentration of 156 milligrams per liter (mg/l), TDS concentration of 410 mg/l, and SEC of 659 micromhos per centimeter. Tongue River Reservoir at the dam has an average sulfate concentration of 180 mg/l, TDS of 440 mg/l, and SEC of 691 micromhos per centimeter. Tongue River at Birney Day School has an average sulfate concentration of 205 mg/l, TDS of 490 mg/l, and SEC of 665 micromhos per centimeter. National Secondary Drinking Water Standards for human drinking water recommend 500 mg/l of TDS and 250 mg/l of sulfate as contaminant level limits.

The Montana Bureau of Mines and Geology recommends maximum contaminant concentrations for drinking water and livestock use (Montana Bureau of Mines and Geology No date). Recommended sulfate is 250 mg/l for drinking water and 1,500 mg/l for livestock. TDS recommendations are 500 mg/l for drinking water and 5,000 mg/l for livestock. Recommended levels of SEC are a maximum of 1,000 micromhos per centimeter for drinking water.

3.7.1.2 Alluvial Valley Floors

Federal law restricts certain activities (such as mining), in designated alluvial valley floors. No designated alluvial valley floors (AVFs) are present within the immediate study area. However, there are extensive potential AVFs along and adjacent to the Tongue River and along most of the perennial tributary channels (Office of Surface Mining, Reclamation, and Enforcement 1985). All AVF and potential AVF designations result from applying the draft "Alluvial Valley Floor Identification and Study Guidelines" (U.S. Department of the Interior 1983).

3.7.2 Groundwater Resources

Excluding alluvial aquifers and aquifers influenced by surface topography, ground water flow in the Tongue River Reservoir area is to the northeast. In the Tongue River Reservoir area, three aquifer-bearing geologic formations overlie the deeper impermeable shales of the Montana Group. From deep to shallow, they are: the Fox Hills, Tullock-Hell Creek (Fox Hills-Lower Hell Creek), and Tongue River members of the Fort Union Formation. The Upper Cretaceous Bearpaw Shale is considered a major confining unit within the group (Slagle et al. 1983). In addition, alluvial sands and gravels serve as productive aquifers where they are thick and well developed. Deep sandstones of the Lakota Formation, carbonate rocks of the Madison Group, and dolomite of the

Red River Formation provide potential but little-used ground water sources. The Fox Hills Formation can yield up to 200 gallons per minute (gpm) to a well, the Tullock-Hell Creek aquifer can yield up to 85 gpm, and the hydrogeologic units of the Tongue River Member produce up to 50 gpm.

3.7.2.1 Ground Water Quality

Ground water from the Fox Hills Formation contains total dissolved solids (TDS) concentrations in the range of 200 to 2,300 mg/l (USBR 1985) and the Tullock-Hell Creek Aquifer averages TDS concentrations of 1,000 mg/l (Woessner et al. 1981). The hydrogeologic units of the Tongue River member contain TDS concentrations in the range of 200-3000 mg/l (Woessner et al. 1981). Quaternary.age alluvial aquifers along the Tongue River and its tributaries can yield up to 700 gpm, with TDS between 280 and 5,600 mg/l (USBR 1985).

There is incomplete information about the three deep aquifers below the Bearpaw Shale identified by Woessner et al. (1981). The Lakota Sandstone is estimated to be 200 feet thick but no data are available on yields or water quality. Artesian flows were encountered in the aquifer during oil exploration drilling and a TDS concentration for the Lakota Sandstone was observed at 2,000 mg/l during the drilling of a U.S. Geological Survey test well. The Madison Group and Red River Formation were encountered during test well drilling (Brown et al. 1977; Blankennagel et al. 1977; and Blankennagel et al. 1979). While yields are available, production in excess of 1,000 gpm can be expected from the Madison Group with TDS concentrations of 1,000 to 1,500 mg/l and temperature in the range of 176° to 212°F. Conclusions with respect to the Red River Formation are few. Yields are expected to be variable and concentrations of TDS are expected to be high.

3.8 WETLANDS

Wetlands are biological communities such as bogs, fens, marshes, and wet meadows that are transitional between aquatic and terrestrial ecosystems. As part of the National Wetlands Inventory, the U.S. Fish and Wildlife Service (USFWS) defined wetlands as having one or more of the following three attributes:

- periodically, the land supports predominantly hydrophytes;
- the substrate is predominantly undrained soils; and
- the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season.

The most widely accepted definition for jurisdictional wetlands is published in the Clean Water Act of 1972 (P.L. 92-500) as follows:

> *"Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.*
>
> *Wetlands must possess three essential characteristics: 1) hydrophytic vegetation, 2) hydric soils, 3) wetland hydrology, which is the driving force creating all wetlands. These characteristics and their technical criteria for identification purposes are described in the following sections. The three technical criteria are mandatory and must all be met for an area to be identified as wetland."*

In a 1992 vegetation report, the Montana Riparian Association (MRA) identified 541 acres of riparian-wetland habitat type in the reservoir area below elevation 3,429 feet that would be affected by the project. In describing the riparian-wetland habitat, MRA stated that the overstory cover, structural diversity of multiple layers within the forested stands, a large contiguous stand (block) of trees near the inlet, open areas and intervening "edges", plus the abundance of food and water sources made the area important wildlife habitat. To comply with Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (COE), U. S. Environmental Protection Agency (EPA), the U. S. Fish and Wildlife Service (USFWS), and the Montana Riparian and Wetlands Association (MRWA formerly MRA) assisted the project sponsors in delineating 314 of

these acres as jurisdictional wetlands requiring mitigation. Most of the 314 acres is composed of sandbar willow wetland. This community is dominated by sandbar willow (*Salix exigua*) and forms wetland fringes that are found around much of the reservoir shoreline. Other wetland types include water smartweed wetland, cattail marsh and tufted foxtail wet meadow. The water smartweed wetlands form in shallow areas, primarily in the southern portion of the reservoir, as water levels recede. The single cattail marsh is composed of dense growths of cattails (*Typha latifolia*) and areas of open water. The tufted foxtail wet meadow is supported by groundwater and dominated by grasses such as tufted foxtail (*Alopecurus Carolinianus*).

3.9 AQUATICS/FISHERIES

Although monitoring of the fishery would be performed from the reservoir to the T&Y Diversion during construction activities, the primary project study area has been limited to a 20-mile reach encompassing the reservoir area because of the scope of identified issues and extent of assessable effects from the proposed action. The study area is located approximately 100 miles northeast (downstream) of the river headwaters in the Big Horn Mountains in Wyoming and 180 miles southwest (upstream) of Miles City, Montana, at the river's confluence with the Yellowstone River. The reach of the Tongue River, including the Tongue River Reservoir, from about Decker, Montana, to its confluence with Four Mile Creek (the project study area) is situated in the southwestern portion of the Fort Union coalfield region. Aquatic biota in the project study area, including fish, are typical of those warm-water species found in the Northern Great Plains, with the exception of a remnant brown trout population and non-reproducing (stocked) rainbow trout fishery that exists for a limited distance downstream of the Tongue River Dam. Deep-water withdrawal from the reservoir, resulting in cool-water discharges, perpetuates the trout fishery. A viable rock bass population also exists in, and is unique to, the Tongue River in Montana.

Instream flows in the Tongue River are required under the Yellowstone River water reservations of 1978. The Montana Department of Fish, Wildlife and Parks (DFWP) was granted a reservation for 75 cfs at Miles City in order to protect aquatic life. This reservation is rarely satisfied because of its late priority date. An additional problem with this reservation is that it does not reflect the actual water requirements for fisheries in the river. This is partially offset in that the high priority decreed water right at the T&Y Diversion for 187.5 cfs protects the resident sport fishery for all but the final 20 miles of river below the diversion (DNRC 1991).

3.9.1 Algae

The algae identified from the Tongue River system generally indicate a moderately enriched, hard-water environment with tendencies toward eutrophication (nutrient enrichment and related loss of dissolved oxygen) when impounded with excessive sediment and salinity near the lower end of the river (Bahls and Bahls 1977; Interstate Commerce Commission 1992). Diatoms are the predominant algae in the southern Fort Union coalfield region (Bahls, Weber, and Jarvie 1984) and in the study reach. Periphyton such as green algae *Cladophora* are abundant in the Tongue River system during fall, while diatom species are prevalent in the spring. Blue-green species *nostoc* are the dominant periphyton in lower reaches of the Tongue River system (including the reservoir), where turbidity is high and the surrounding area is modified by heavy grazing and irrigated hay production.

3.9.2 Macroinvertebrates

Macroinvertebrates are abundant in the Tongue River and its tributaries (Interstate Commerce Commission 1994). A 2-year Water Quality Bureau biological benthic inventory of streams draining the southern Fort Union coalfield area in southeastern Montana, including stations on the Tongue River, describes the existence of a fairly diverse, highly productive, generally healthy, and dynamic set of benthic macroinvertebrate associations in the study area (Klarich and Regele 1980). Turbidity, siltation, and

flow depletion in the lower portion of the Tongue River affect the relative abundance and biomass of certain sensitive species (Interstate Commerce Commission 1992).

3.9.3 Fish

3.9.3.1 Tongue River Reservoir

Tongue River Reservoir supports a warm-water fishery that is primarily self-sustaining (Interstate Commerce Commission 1992). The reservoir contains 24 species of fish (**see Appendix F**). Game fish include northern pike, channel catfish, largemouth and smallmouth bass, walleye, sauger, and brown and rainbow trout. Sport fish also of interest to the angler are black and white crappie, rock bass, bullhead, sunfish, and yellow perch (DFWP No date; USFWS 1992). Other forage fish common to warm-water fisheries in Montana are also found in the reservoir including the spottail shiner introduced recently as a food source for the game fish population.

The reservoir has been operated at reduced average pool elevations for the past 16 years since high flows damaged the spillway in 1978. Reservoir drawdowns have affected the shallow cove and small bay habitat, driving immature game fish from preferred rearing areas into the open reservoir, thereby increasing losses to predation.

DFWP personnel found declining use of the reservoir by walleye for spawning and rearing, beginning around 1980. This was assumed to be the result of, or aggravated by, winter drawdowns. In recent years, DFWP has stocked walleye fry and fingerlings in the reservoir to supplement natural reproduction. That agency has reported a recent (1990) resurgence in the walleye fishery in response to the stocking program. They also reported increased crappie sizes in all age classes, probably in response to increased walleye predation on small crappie (USFWS 1992). Recent creel census data on fishing pressure indicate that the crappie harvest is over 25 times higher than it was in the early 1980s and accounts for about 89 percent of the fish kept from the reservoir. In response to this increased pressure, a crappie limit of 15 fish per angler per day, with a possession limit of 30 fish per angler, will be instituted for Tongue River Reservoir effective March 1, 1996. This limit was approved by the Fish and Game Commission in November, 1995.

The annual reservoir temperature under present operation ranges from 32° to 74°F. The reservoir does not thermally stratify in summer, apparently due to the slight current, water withdrawal management, and wind action. Despite lack of stratification, there is a slight dissolved oxygen (DO) deficit near the reservoir bottom during part of the summer (Whalen 1979 *In* Larry Dolan, DNRC, memo to Greg Ames, March 30, 1994). Fluctuating water levels combined with climatological factors produce a habitat favoring warm-water species, although the late-summer through early spring reservoir drawdowns of recent years likely impacted some fish populations.

3.9.3.2 Tongue River Upstream of the Reservoir

The influence of the Tongue River reach upstream of the reservoir upon those species largely dependent on the reservoir has not been thoroughly studied, although limited river sampling has been done (USFWS 1992; DFWP No date). DFWP's Application for Reservation of Water in the Yellowstone River Basin (Montana Fish and Game Commission 1976) lists 14 fish species present in the Tongue River from the Wyoming line to the reservoir, including sauger, walleye, smallmouth bass, channel catfish, and rock bass, all of which are also found in the reservoir. Sampling suggests use of this river reach by migrating sauger and walleye in the spring for spawning when sufficient flows exist. There is potential use by other fish species from the reservoir, but this has not been documented.

3.9.3.3 Tongue River Below the Dam

DFWP classifies approximately 189 miles of the Tongue River downstream from the dam to its mouth into four reaches: the dam to Four Mile Creek (about 10 miles in length and part of the present focus of assessment), Four Mile Creek to S-H Diversion, S-H Diversion to T&Y Diversion, T&Y Diversion to the Yellowstone River.

A total of 19 fish species are listed by DFWP in the stretch of the river from the Tongue River Dam to Four Mile Creek, which includes the major game and sport fish species found in the reservoir (DFWP No date). A reproducing population of brown trout exists in this reach and DFWP stocks 2,000 rainbow trout in this section annually (Phillip Stewart, DFWP, personal communication, December 12, 1994). The trout populations exist because the outlet works draws water from near the reservoir bottom and releases this relatively cool water into the river.

The low level outlet releases water as much as 10°F cooler than the reservoir inlet water temperature, which may reach 78° F in summer (L.Dolan, pers. comm., March 30, 1994). Further downstream the water warms, and the river changes into a more typical warm-water prairie stream. From Four Mile Creek to S-H Diversion, DFWP lists 22 warm-water fish species in the river. From S-H Diversion to T&Y Diversion, it lists 15 warm-water species, and from T&Y Diversion to the Yellowstone River, 20 warm-water species are listed (DFWP No date). The latter reach includes paddlefish, shovelnose sturgeon, the blue sucker, and the sturgeon chub. The river below the T&Y Diversion is also an important historical spawning area for sauger and shovelnose sturgeon migrating from the Yellowstone River when sufficient flows exist in spring and early summer. High flows are necessary during this time frame to ensure successful migration, spawning and rearing of these fishes. Reduced flow as a result of drought during the 1980s and reservoir operations since 1978 have affected the fishery (USFWS 1992).

3.9.4 Aquatic Amphibians and Reptiles

Amphibians observed in the Tongue River Dam area included the leopard frog, and the northern chorus frog (**see Appendix F**). The snapping turtle, a reptile, also has been seen (USFWS 1992). Other common species associated with aquatic habitats for some part of their life cycle are likely to include: the tiger salamander, plains spadefoot toad, painted turtle, and spiny-softshell turtle (USFWS 1992).

3.10 WILDLIFE

3.10.1 Terrestrial Wildlife

Past studies in the vicinity of the Tongue River Reservoir list twenty species of mammals and four species of non-aquatic reptiles (Martin, DuBoise, and Youmans 1981). Appendix F lists the species observed in a decade-long study by DFWP, but does not include bobcat, mink, and white-tailed jackrabbit which are known to inhabit the area. Terrestrial reptiles in the area, but not included in the table, likely include the northern sagebrush lizard and garter snake (USFWS 1992).

Terrestrial wildlife habitat in the study area is comprised of grasslands, scrub forests, and riparian plant communities fairly typical of the region. The Tongue River Basin provides extensive, good quality habitat for three species of big game animals: mule deer, white-tailed deer, and pronghorn antelope. A white-tailed deer herd uses the diverse riparian zone at the south end of the reservoir. Although a narrow intermittent band of riparian vegetation exists along the reservoir shoreline, its habitat value is limited to isolated pockets where naturally occurring drainages converge on the reservoir margin. These areas, and others located downstream of the dam, provide a multi-layered vegetation canopy and are considered good white-tailed deer habitat. Mule deer occur throughout the study area. They use the willow thickets and other woody vegetation at the south end of the reservoir during the summer and fall and use the upland scrub forest, north and east of the reservoir, during the winter months (USFWS 1992).

The most visible aquatic habitat is Tongue River Reservoir; however, the Tongue River is more important ecologically, and is essential to much of the remaining natural flora and fauna. The river has been altered extensively by the dam and agriculture. As a result, the river has become more confined and incised, meanders and oxbows have become more isolated, and the riparian habitat along the river has dwindled (USFWS 1992).

The majority of pronghorn antelope use of the immediate project area is on grassland habitat along Deer Creek, near the southeast side of the reservoir and north of the East Decker Mine, and on the west side of the reservoir around the Spring and Pearson Creek drainages, where antelope numbers have increased in recent years. This species is widely scattered throughout the project area and is generally considered moderately numerous (USFWS 1992).

The zone of woody riparian habitat with its "layered" vegetative structure at the south end of the reservoir attracts a much more diverse song bird fauna than the surrounding grasslands and forests. The relatively narrow intermittent riparian areas were also found to have more than twice the number of species as were found in adjacent habitats (Eng 1994). Many of the species observed were neotropical migrants (birds that migrate between this area and the southern U.S. and tropical areas further south).

Several species of gamebirds occur within the general project area. Sharp-tailed grouse occupy upland habitats along the Tongue River Reservoir, although their populations are not high. Four of the five known historical leks were disturbed by the development of the East Decker Mine. The remaining lek was located along the west side of the reservoir (Martin, DuBoise, and Youmans 1981).

Decker (1990 *In* USFWS 1992) reported high numbers of wild turkeys along the Tongue River and associated tributaries, and on lands reclaimed following coal mining on the east side of Tongue River Reservoir. One single-day count of 92 turkeys was made on a tract of reclaimed lands in February 1989.

Ring-necked pheasants are common, and although populations in southeastern Montana generally have been low in recent years, they may be considered locally numerous in certain areas, including in riparian areas along Tongue River and near the mouths of small tributaries. Tongue River pheasant spring breeding populations have shown improvement in recent years over those existing for nearly a decade (USFWS 1992).

3.10.2 Waterfowl

Most species of waterfowl common to eastern Montana have been observed during migration on the reservoir or the river downstream from the dam. Mallards, shovelers, Canada geese, common mergansers, and blue-winged and green-winged teal are quite common during migration (Martin, DuBoise, and Youmans 1981). Gadwall and wood ducks are also common, and pintail occur. Canada goose production on Tongue River Reservoir has been monitored for many years by Decker Coal Company; since 1981, known nesting pairs have remained fairly constant, at between 16 and 24, with the number of young produced ranging between 37 and 98. The mallard was reported as a confirmed breeder on the site (Martin, DuBoise, and Youmans 1981). The American wigeon was listed as a suspected breeder based on its presence during the breeding season. Wood duck broods have since been observed at the upper end of the reservoir (John Berry, Decker Coal Company, personal communication, December 5, 1994); five pairs were observed on May 25, 1993. Dense cover at the south end of the reservoir makes it difficult to get an accurate estimate of nesting birds. Reservoir operations during the nesting season have been a major factor in the rate of nest failure. Decker's surveys indicate a high count of between 100 and 150 Canada geese each year on the reservoir (USFWS 1992).

An aerial census of waterfowl numbers in October 1992, (peak of migration) revealed approximately 875 ducks on the entire reservoir during mid-day, of which 70 to 80 percent were mallards. One group of 30 to 35 redheads and another of 25 lesser scaup were present. Both species are dependent on an aquatic food source. This relatively low number and species diversity may indicate only moderate waterfowl habitat.

A large double-crested cormorant and great blue heron rookery has existed for some years in water-killed cottonwood trees at the southern end of the reservoir. Over the past several years, the dead trees supporting this rookery have begun to fall; ten nests were reportedly lost in this manner in a single year. The original rookery is now quite decadent.

However, for the most part, these nest losses have been compensated for by a concurrent build-up of the nesting complex in live cottonwoods along the river further south (upstream). Overall, occupied nests for the decade 1980-89 ranged between 82 and 205 for the great blue heron, and for the last 5 years of that period, appear to have stabilized at between 106 and 124. Double-crested cormorant nest counts reveal a generally similar picture, ranging between 101 and 188 for the 10-year period (USFWS 1992).

A pair of ospreys are known to have successfully nested along the reservoir for several years. This osprey nesting was encouraged by construction of several artificial nest platforms, some of which have been used by Canada geese. In the spring of 1991, this osprey pair appears to have established a new nest about 1 mile from the reservoir, on Decker Coal Company land (J. Berry, pers. comm., December 5, 1994).

3.10.3 Threatened and Endangered, and Candidate Species

Six Federally listed Threatened and Endangered (T&E) wildlife and fish species that may occur on or near the project area, or which may potentially be affected by the project, are discussed below. Further details on T&E species can be found in Appendix B.

The 22 Category 1 and 2 Candidate species (species for which the USFWS has enough information on vulnerability and threat to support listing as T&E, or species for which USFWS has information indicating that listing is perhaps appropriate but for which conclusive data currently are not available to support a T&E listing) are discussed in Appendix B.

Threatened and Endangered Species

Bald eagle	*Haliaeetus leucocephalus*	Endangered
Peregrine falcon	*Falco peregrinus*	Endangered
Piping plover	*Charadrius melodus*	Threatened
Least tern	*Sterna antillarum*	Endangered
Pallid sturgeon	*Scaphirhynchus albus*	Endangered
Black-footed ferret	*Mustela nigripes*	Endangered

The bald eagle occurs in the project area as a seasonal migrant, as well as a wintering and breeding species. Although specific data are apparently lacking, a number of biologists have previously indicated that the Tongue River may be an important seasonal migration corridor. Bald eagles have also been seen consistently (but in small numbers) on Tongue River Reservoir, especially in late spring after most of the ice is out (J. Berry, pers. comm. 1992). These may be birds that wintered on the river below the dam and some seasonal migrants. Apparent pair-bonding activity was seen at a tree-nest site near the river about 2.5 miles downstream of the dam in 1983. Pair-bonding activity was also seen in 1992, 1994, and 1995.

No peregrine falcon nesting territories are known to exist near enough to the project area to be of concern. Although the falcon has been sighted in the general area (Martin et al. 1981) (Decker 1990), it is assumed to be a migrant only, although at least marginally suitable nesting habitat exists in Tongue River Canyon below the dam.

Both the piping plover and least tern likely occur in the project area at times as seasonal migrants. However, neither species was identified by Martin et al. (1981), and discussions with a variety of biologists experienced in the general area failed to uncover any historic sightings. Neither Tongue River nor the reservoir appear to offer habitat physically suitable for piping plover or least tern nesting. Most known piping plover nesting in Montana occurs on barren flats of saline or otherwise unvegetated beaches of lakes and wetlands in northeastern Montana. Tern nesting is even less common and is largely confined to the same river habitats as the plover.

The historic occurrence of the pallid sturgeon in Montana is known to have included the Yellowstone River at least as far upstream as the mouth of Tongue River. Many of the documented historic sightings of the pallid sturgeon in the Yellowstone River contained in a recent USFWS status report on this species (USFWS 1989) occurred at the mouth of the Tongue or very nearby in the Yellowstone. Fishery experts have stated that the aquatic habitat at the mouth of the Tongue, and of the Yellowstone River in the immediate vicinity, appears to be physically well suited to what is known of the pallid sturgeon's

life history requirements (M. Dwyer, USFWS; pers. comm. 1991). The area is inhabited by the closely related shovelnose sturgeon (*Scaphirhynchus platorhynchus*), which also suggests the area would be well suited to the pallid. Recent captures of pallids above and below Intake Diversion on the Yellowstone show that the species could possibly still be found in the Tongue.

Black-footed ferrets depend on prairie dogs (Cynomys sp.) for their existence. A small, probably isolated, black-tailed prairie dog town on the east side of the reservoir near the intermittent Deer Creek drainage, might conceivably be impacted by the proposed reservoir pool. Black-tailed prairie dogs and their burrows are fairly abundant in downstream areas that have not been affected by the sylvatic plague.

3.11 VEGETATION

Natural vegetation in the vicinity of the Tongue River Dam and Reservoir is composed of plant communities that have developed in response to differing amounts of soil moisture, past disturbances (e.g., fire, floods, livestock grazing, recreational development and crop production), and other environmental factors. Species composition and growth patterns range from relatively dry mid-grass prairie, and coniferous forest dominated by Rocky Mountain juniper and ponderosa pine to moisture-dependent riparian forest vegetated by Great Plains cottonwood, green ash, and box elder with a diversity of deciduous shrubs and herbaceous species, adapted to moist growing conditions.

Plant communities on the margin of the reservoir have established as a result of fluctuations of reservoir water levels (generally between elevation 3,398 and 3,425 feet) since the dam was constructed. About 1,520 acres of riparian and wetland plant communities occupy the shoreline and upper end of the reservoir. Peachleaf willow, sandbar willow, and Great Plains cottonwood have colonized bare soil on large portions of the reservoir margin that periodically flood (below elevation 3,425 feet). Flooding usually occurs during spring runoff in years of high precipitation. For successful seed germination and growth, these species require bare, water-saturated soil in the spring, followed by slowly receding water levels during the growing season (Miles and Hansen 1992).

In recent years, reservoir water levels have been maintained well below full pool because of structural concerns with the dam and spillway. During most years, reservoir water levels are below elevation 3,410 feet from August to April and peak at elevation 3,420 feet for a week or two in June (**see Figure 3-4**). As a result, reservoir water fluctuations have infrequently flooded vegetated shorelines above elevation 3,420 feet. Infrequent flooding has allowed shrubs and trees that have colonized from seed to form dense stands down to elevation 3,420 feet. Below elevation 3,420 feet, annual inundation, wave action and, possibly ice formation has maintained the shoreline in a disturbed state. Consequently, species adapted to annual cycles of disturbance have become established (e.g., sandbar willow).

Other major riparian plant communities are dominated by green ash/chokecherry (below elevation 3,425 feet, mostly at the upstream end of the reservoir), western wheatgrass (elevation 3,427 to 3,430 feet), and silver sagebrush/western wheatgrass (mostly above elevation 3,430 feet). Other minor wetland and riparian plant communities have a predominance of water smartweed, common spike-sedge, and prairie cordgrass.

Small populations of salt-cedar have colonized portions of the reservoir margin. In the absence of control measures, this aggressive pioneer species could become established on much of the reservoir margin and displace desirable native species.

Major upland plant communities, adjacent to the reservoir include: grasslands comprised primarily of needle-and-thread, sun sedge, western wheatgrass, and bluebunch wheatgrass; shrublands dominated by big sagebrush and wheatgrass species; and forest communities with sparse overstory canopies of Rocky Mountain juniper and ponderosa pine, and grass-dominated herbaceous understories.

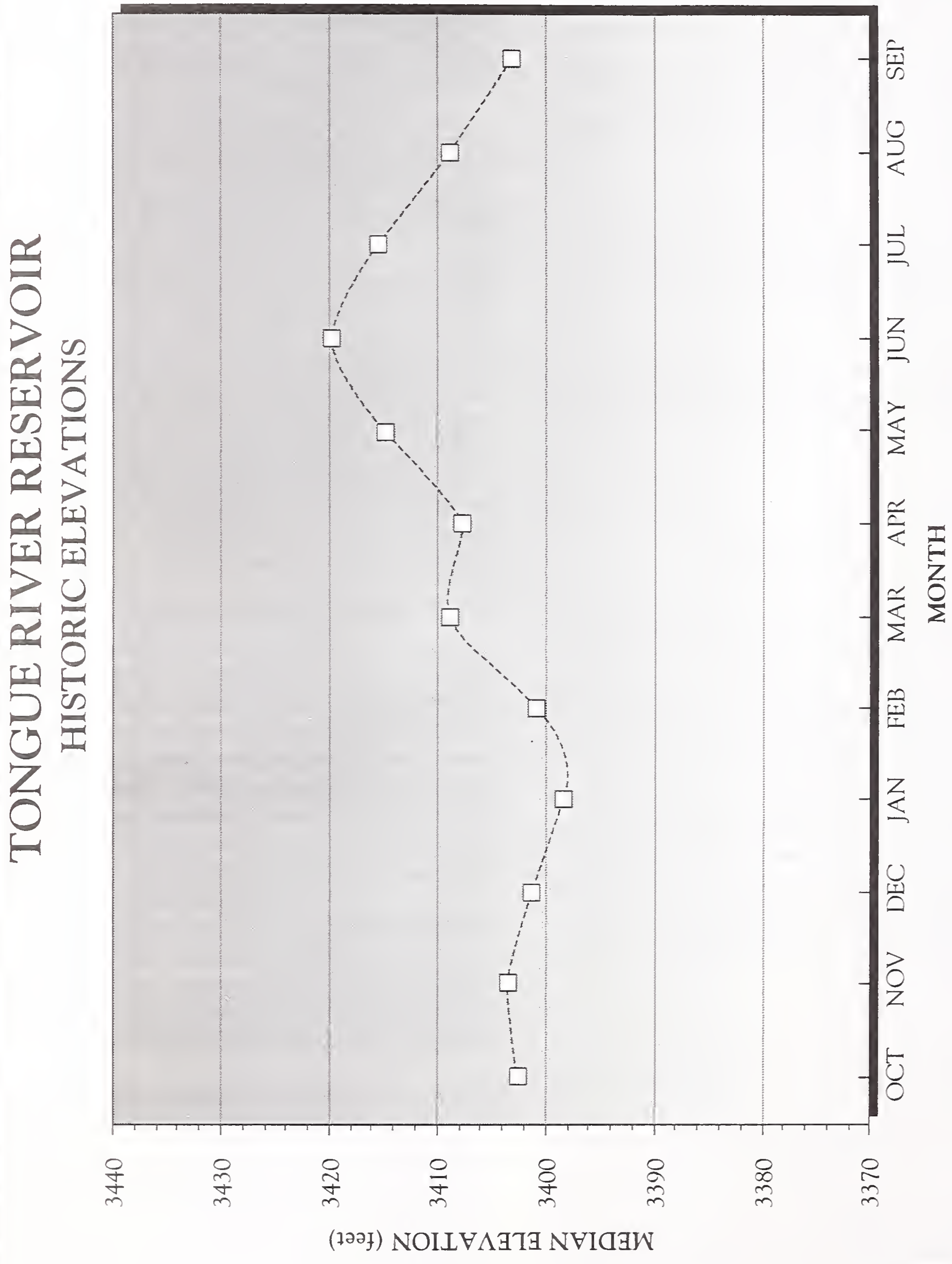


Figure 3-4. Tongue River Reservoir Historic Elevations

Downstream from the dam, riparian communities of Great Plains cottonwood, green ash, and box elder with understory canopies of sandbar willow, peachleaf willow, and other shrubs occupy portions of the Tongue River floodplain that have not been converted to cropland. Ecological factors that control the establishment and maintenance of riparian vegetation in the area are directly associated with periodic over-bank flooding and channel migration that scour streambanks and terraces, and deposit sediment. Cottonwoods and many willow species require nonvegetated, recently deposited alluvium for successful seed germination and establishment. The ideal environment for seed germination is constantly moist silt, sand, or gravel in full sunlight. Seeds germinate within 48 hours and must have a continuous supply of moisture for several weeks. Competition for moisture by herbaceous vegetation, particularly sod-forming grasses, greatly reduces survival of seedlings (Fowells 1965). Cottonwood and willow species may require maintenance of relatively high ground water levels during their first summer when their roots have not penetrated very deeply (Bradley, Reintjes, and Maloney 1991). Periodic over-bank flooding and newly deposited sand and gravel bars create ideal conditions for germination and growth of cottonwoods and willows.

Since construction of the dam, natural floods downstream have been reduced in magnitude and frequency. The effect that the existing dam has had on riparian vegetation and stream channel geomorphology is not well known; however, observations of downstream plant communities indicate that reproduction of cottonwoods and willows is occurring primarily along the streambanks, lower terraces subject to floods, and on sandbars. Periodic channel migrations accompanied by erosion of streambanks and deposition of alluvial material to form sand bars is essential to the maintenance of riparian cottonwood and willow communities. As channel meanders migrate, streambanks are eroded and trees and other plants are destroyed. At other places, however, streambanks are built where sediment is deposited by the river. Both cottonwood and willow rapidly colonize recently deposited sediments. The continual processes of channel migration and deposition of alluvium are important to the establishment of cottonwood and willow communities.

Older stands of cottonwood on portions of the floodplain that have not been inundated since construction of the dam may be dying out due to natural aging. Typically, development of plant communities begins with seedlings of sandbar willow and cottonwood becoming established on gravel bars or other fluvial deposits. After about 15 years, cottonwood saplings become dominant and willow begin to decline (Boggs 1984). After about 30 years, riparian cottonwood forests are well developed and after 60 years, mature trees start to decline in vigor and die. Most cottonwoods live less than 90 years, usually dying from heart rot and windthrow (Boggs 1984).

Noxious weeds that could be found in the Tongue River Reservoir area include Canada thistle, field bindweed, white top, leafy spruge, Russian knapweed, spotted knapweed, St. Johnswort, sulfur cinquefoil, common budock, henbane, water/poison hemlock, and musk thistle.

3.11.1 Ethnobotanical Resources

Investigations of historic and current use of plants in the vicinity of the Tongue River Reservoir identified 62 ethnobotanical plant species used by Native Americans (Aaberg and Tallbull 1993). Some ethnobotanical species such as scouring-rush, great bulrush, and cattail are restricted to shoreline and wetland habitats along the reservoir margin; these species are common in eastern Montana.

3.12 BIODIVERSITY

Recent federal policies have established that conservation of biological diversity is of national importance and should be addressed in the NEPA process and in other federal management and planning activities. Biological diversity is defined as the variety of life and its processes, including the variety of organisms, genetic differences among them, and communities and ecosystems in which they occur (Keystone 1991). Fundamental to the understanding of biological diversity is the recognition that the biological world is not a series of unconnected elements, and the richness of the

mix of elements and the connections between those elements are what sustain the ecosystem as a whole.

The basic goal of biodiversity conservation is to maintain naturally occurring ecosystems, communities and native species. Managing for biological diversity through ecosystem management, is complex and requires consideration of the ecosystem as a whole, rather than focusing on single species or isolated habitats.

Natural habitats such as prairie grassland, shrubland, and ponderosa pine communities are relatively common and are predominant landscape components in the project area and regionally. Throughout the United States and Canada, however, native prairie grassland and shrubland have been greatly decreased by agricultural activities, fire suppression, livestock overgrazing, and introduction of aggressive exotic plants. Many wildlife species associated with native prairie and shrubland are declining in abundance, and their geographic ranges are contracting. Species with a strong affinity for native prairie and shrublands include: pronghorn antelope, badger, swift fox, black-tailed prairie dog, grasshopper mouse, white-tailed prairie dog, black-footed ferret, sage grouse, sharp-tailed grouse, Baird's sparrow, burrowing owl, upland sandpiper, long-billed curlew, Swainson's hawk, ferruginous hawk, western kingbird, meadowlark, loggerhead shrike, grasshopper sparrow, prairie rattlesnake, plains spadefoot toad, short-horned lizard, and sagebrush lizard.

Species diversity in aquatic habitats of the project area has been altered by construction of the Tongue River Dam, irrigation water diversions, and introduction of plants and fish not native to the region. Fish populations in the Tongue River Reservoir are predominantly comprised of introduced species such as smallmouth bass, largemouth bass, rock bass, northern pike, brown trout, rainbow trout, carp, walleye, and crappie. Similarly, a high proportion of fish species in the Tongue River are introduced. Currently, native fish (e.g., blue sucker, pallid sturgeon, plains minnow, flathead chub, and sturgeon chub) and other aquatic species (e.g., snapping turtle and spiny softshell turtle) present in the Tongue River are of concern because of reductions in population abundance over their range of occurrence.

Although species diversity is relatively high in the Tongue River and Tongue River Reservoir, much of the diversity results from proliferation of introduced species, perhaps at the expense of native species. From an ecosystem management perspective, introduction of non-native species should be avoided and management for native species encouraged. Although a large component of the fishery is composed of non-native species, these fish are valued for recreational purposes and management decisions have been made to retain and enhance their dominance within the project area.

3.13 SOCIOECONOMICS

3.13.1 Social Environment

The study area for sociological resources (social life, community service providers, and housing) includes the Northern Cheyenne Reservation and the communities of Ashland and Birney, Montana. The study area was limited to the reservation and these communities because of the Tribal Employment Rights Office (TERO) Agreement (**see *Economic Environment***) entered into by the Northern Cheyenne Tribe and the State of Montana.

3.13.1.1 Social Life

The Cheyenne first lived in the upper midwestern region of the United States (Bryan Jr. 1985). Around 1830, the Cheyenne divided into two groups, the Northern and Southern Cheyenne. The Southern Cheyenne moved south and settled in parts of Arkansas, Colorado, Kansas, and Oklahoma; whereas the Northern Cheyenne moved into the Black Hills of South Dakota, northern Wyoming, and southern Montana. The Northern Cheyenne eventually settled in the Tongue River area of Montana. In 1884, President Chester Arthur signed an executive order establishing the 371,200-acre Tongue River Indian Reservation. In 1891, President William McKinley issued an executive order expanding the reservation to 444,157 acres and referred to the reservation as the Northern Cheyenne Indian Reservation, which eventually replaced the old name of the Tongue River Indian Reservation (Weist 1977).

Events of importance to social life on the reservation include ceremonial life (e.g., sweats, fasting, sundance), pow-wows, school sporting events, rodeos and gathering food (fishing, hunting, berry gathering), outdoor hiking, and riding horseback on the reservation.

3.13.2 Community Service Providers

3.13.2.1 Education

Public schools on or near the reservation include Lame Deer Elementary (kindergarten through grade 6), Lame Deer Middle School (grades 7 and 8), Lame Deer High School (grades 9 through 12), Birney School (kindergarten through grade 8), Ashland Elementary School (kindergarten through grade 6), and Ashland Middle School (grades 7 and 8). Northern Cheyenne Tribal Elementary School (kindergarten through grade 8) and Northern Cheyenne Tribal High School (grades 9 through 12) in Busby are BIA-funded private schools, accredited by the State of Montana. St. Labre Indian School in Ashland is a Catholic parochial school providing education to students enrolled in kindergarten through grade 12. St. Labre Elementary School is not accredited by the State of Montana, but the high school is state accredited (Sharyn Thomas, Rosebud County Superintendent, personal communication, December 1, 1994).

Lame Deer High School opened in 1994. Prior to that time, high school students from Lame Deer and the surrounding area were bused to Colstrip, St. Labre, Busby, Hardin, or Broadus, Montana, to attend high school (S. Thomas, pers. comm., December 1, 1994). To open the high school by fall 1994, a large modular unit was purchased to be used as temporary classrooms. The modular unit probably will be used in the future to house middle school students, freeing up the middle school for elementary school students (Leslie Wells, Lame Deer High School, personal communication, December 6, 1994).

Total school enrollment increased between school years 1991-92 and 1993-94 in the Lame Deer, Ashland, and Birney schools and decreased in the Northern Cheyenne Tribal School. Preliminary school enrollment numbers for school year 1994-95 indicate increased enrollment over 1993-94 school year for Lame Deer, Ashland, and Busby schools and decreased enrollment for Birney School. In school year 1994-95, preliminary enrollment figures were 544 students in Lame Deer School; 119 students in Ashland School; 188 students in Northern Cheyenne Tribal School; 12 students in Birney School; and 368 students in St. Labre School (Montana Office of Public Instruction 1994; S. Thomas, pers. comm., December 1, 1994).

Dull Knife Memorial College was chartered by the Tribal Council in 1975 as part of the Northern Cheyenne Indian Action Program to provide vocational training for mining jobs in communities near the reservation. Academic courses were offered in 1978; however, since that time, the curriculum has expanded and the college now offers an Associate of Arts Degree in academic disciplines, an Associate of Applied Science in vocational areas, vocational certificates in several skill areas, and G.E.D. instruction and testing (Montana Office of Public Instruction and Montana Board of Crime Control No date; Feeney 1986).

3.13.2.2 Law Enforcement

Law enforcement is provided on the reservation by the Bureau of Indian Affairs (BIA) Law Enforcement Office, the Montana Highway Patrol, the Rosebud County Sheriff's Department, and the Big Horn County Sheriff's Department. The BIA Law Enforcement Office is the primary agency for maintaining law and order on the reservation (Wood Star, BIA, personal communication, December 1, 1994).

The BIA Law Enforcement Office consists of the Police Department and Criminal Investigation Department. The latter is staffed by two criminal investigators, responsible for investigating major crimes committed on the reservation (Winfield Russell, BIA Criminal Investigation Bureau, personal communication, December 1, 1994). The Police Department is staffed by 14 officers, responsible for law enforcement duties on the reservation (U.S. Department of the Interior 1994).

The Adult Detention Facility, located in Lame Deer, was renovated in 1986 to house 18 adult offenders. Five jailers are on staff. There is no juvenile detention holding facility on the reservation. If a juvenile is apprehended by the police, parents of the juvenile are notified to pick up their child at the police station (Wayne Head Swift, BIA Police Department, personal communication, December 2, 1994). Juveniles apprehended for more serious crimes are transported to the juvenile detention center in Billings (W. Star, pers. comm., December 1, 1994).

The Montana Highway Patrol and county sheriff departments have limited jurisdiction on the reservation: they respond to traffic violations and accidents, but only have jurisdiction over non-Indians (Colonel Craig Reap, Montana Highway Patrol, personal communication, December 1, 1994).

3.13.2.3 Fire Protection

Wildland fire protection on the reservation is provided by the BIA Forestry Department with cooperative agreements with the Bureau of Land Management, Department of Natural Resources and Conservation, U.S. Forest Service, Northern Cheyenne Tribe, volunteer fire departments on the reservation, and local ranchers who live close to the reservation boundaries (Renessa Russette, BIA Forestry Department, personal communication, December 1, 1994). Structural fire protection is provided by volunteer firefighters in Lame Deer.

The service area of the Lame Deer Volunteer Fire Department includes Lame Deer, Ashland, Busby, and Birney, Montana. Six of the 12 volunteer firefighters are on call to respond to fire emergency situations. The two fire trucks used by the Fire Department are old and, with the hilly terrain on routes used to reach the communities they serve, probably only travel between 45 and 50 MPH. Although the volunteers are quick in responding to fire calls, the trucks slow the response time down to an estimated 35 minutes to reach Ashland, 20 minutes to Busby, and 35 minutes to Birney (Elrena Whitedirt, Lame Deer Volunteer Fire Department, personal communication, December 5, 1994). Water for firefighting purposes is not always readily available. Fire hydrants in the communities are limited and old, with many scattered homesites. The main source of water to fight fires in some areas is nearby streams.

Insurance Services Office (ISO) Commercial Risk Services, Inc. inspects the adequacy of fire departments nationwide to determine ratings for property covered by insurance agencies. On an ISO scale of 1 to 10, with class 1 being the highest rating and 10 being virtually unprotected, the Lame Deer Fire Department has a class 8 fire protection rating (Cara Feigal, ISO Commercial Risk Services, Inc., personal communication, December 5, 1994). The Fire Department needs additional volunteers, fire equipment, and firefighting vehicles to provide more reliable fire protection service to the communities (E. Whitedirt, pers. comm., December 5, 1994).

3.13.2.4 Ambulance Services

Ambulance and first responder services on the reservation are provided by the Northern Cheyenne Ambulance Service and the Ashland Quick Response Unit (QRU). The Northern Cheyenne Ambulance Service, operated by the Tribe, has 15 ambulance attendants including seven basic emergency medical technicians (EMTs), one EMT-I, six EMTDs (certified to operate defibrillator equipment), and one nurse. The 24-hour ambulance service maintains three first responder ambulances (P. Scott, Montana Department of Environmental Quality, personal communication, December 2, 1994).

The Ashland QRU is under the auspices of the Rosebud County Emergency Medical Service in Forsyth. The QRU is a non-transporting service that is first on the scene to stabilize patients. A pager system is used to alert the six first responders of emergency situations (P. Scott, personal comm., December 2, 1994).

3.13.2.5 Health Care

The Indian Health Service (IHS) Unit provides free health care services to Northern Cheyenne Tribal

members, Native Americans from other tribes, and individuals who have proof they are a direct descendant of a Native American (Clara Spotted Elk, Northern Cheyenne Tribe, personal communication, December 7, 1994). Lame Deer comprises about 50 percent of the total IHS Service Unit population. Constructed in 1977, the Lame Deer Health Center offers the following services (Montana Office of Public Instruction and Montana Board of Crime Control No date; U.S. Department of Health and Human Services 1994):

General Medical Services

Curative services, pharmacy, inpatient services, referral services to Crow Public Health Service Indian Hospital, 24-hour physician, and OB-GYN clinic.

Ambulatory

Optometry, dental, well-child clinic, prenatal clinic, and diabetes clinic.

Specially Arranged Services

Orthopedics, mammography, ENT, and communication disorders.

Preventative Health Services

Public health nursing, mental health, medical social services, environmental health/engineering, Women Infants and Children (WIC), family planning, prepared childbirth education, postpartum and newborn follow-up.

Community Health Representative (CHR) Program

Paraprofessional services in outreach care and health promotion/disease prevention throughout the communities.

During fiscal year (FY) 1993, the Lame Deer IHS Health Center had 40,558 direct outpatient visits, an increase of 5 percent over FY 1992 (U.S. Department of Health and Human Services 1994). Northern Cheyenne patients requiring inpatient care are referred to the Crow Public Health Service (PHS) Hospital, 42 miles from Lame Deer, or to community hospitals in Sheridan, Wyoming and Billings, Montana.

3.13.2.6 Public Assistance and Social Services

Public assistance and social services offered on the reservation are comparable to services available to other U.S. citizens. State-assisted programs such as food stamps, aid to families with dependent children, and Medicaid are provided through the Rosebud County Welfare Offices (Carol Charleson, Rosebud County Public Welfare Office-Colstrip, personal communication, December 5, 1994). The Welfare Office in Lame Deer, which handles most cases for reservation clients, also provides referrals for clients to other public/social service agencies on the reservation (Dianne Pearce, Rosebud County Welfare Office-Lame Deer, personal communication, December 5, 1994).

Many social service programs on the reservation are administered by the Tribe and receive funding from state, federal, and Tribal governments. Programs include General Assistance Program, Indian Child Welfare Act Program, Tribal Charity Program, Temporary Children's Shelter, Low Income Housing Energy Assistance Program (LIHEAP), Housing Authority, Elderly Program, Food Commodities Program, Welfare Reform Proposal Program, Alcoholism Program, Job Training Partnership Act Program, and WIC Program (D. Pearce, pers. comm., December 5, 1994; Louise Reyes, Social Services, BIA, Billings Area Office, U.S. Department of the Interior, personal communication, December 5, 1994; Montana Office of Public Instruction and Montana Board of Crime Control No date).

3.13.2.7 Water Supply and Wastewater Treatment

The Northern Cheyenne Utilities Commission is responsible for operation and maintenance of community water and wastewater treatment facilities. Two more wells are needed in Lame Deer to provide reliable water supply during peak usage in summer. The storage capacity of the water storage tank in Lame Deer is adequate to meet the demand of the community. In Busby, two new wells have been drilled; however, money is unavailable at this time to purchase the pumps needed to draw the

water from the wells. The water storage tank in Busby does not provide enough storage capacity to meet the demand of the community. The municipal wells in Lame Deer and Busby are outside of the Tongue River drainage. It is anticipated that these wells will be of a relatively small capacity. The number of wells and storage tank capacities in Ashland and Birney are adequate for the community served (Steve Little Bird, Northern Cheyenne Utilities Commission, personal communication, December 2, 1994).

The wastewater treatment facility in Lame Deer is sufficient for the size of the community. The sewage treatment facilities in Busby, Ashland, and Birney are over-designed; consequently, they do not receive enough water to operate efficiently (S. Little Bird, pers. comm., December 2, 1994). Scattered homesites throughout the reservation use individual wells and septic tank systems. A priority of the Tribal Development Fund, provided by the Settlement Act, is to address the inadequacies of water supply and wastewater systems on the reservation.

3.13.2.8 Solid Waste

Canister sites on the reservation are in Lame Deer, Busby, and Muddy. Garbage is hauled from the canister sites to Colstrip or Hardin, depending on the county in which the solid waste originated. About 1 year ago, the Tribe initiated curbside garbage pickup and disposal service. This service is provided free to the elderly and handicapped, but other Tribal members and the Housing Authority must pay a monthly fee if they choose to participate in the curbside service (C. Spotted Elk, pers. comm., December 7, 1994).

The annual budget for solid waste disposal is $179,000 ($105,000 general funds and $74,000 income generated). Additional funding is needed to purchase new equipment.

There are no licensed landfills on the reservation; however, there are several "informal" dump areas. Due to recent EPA regulations, the Tribe is in the process of closing and reclaiming these sites (C. Spotted Elk, pers. comm., December 7, 1994).

3.13.3 Warning System

A formal warning system and Emergency Plan (DNRC 1992) has been installed to warn downstream inhabitants in the event of dam failure. The Emergency Plan has been prepared in compliance with the Montana Dam Safety Act and the resultant administrative rules. The purpose of the plan is to provide early warning to affected persons in the event of failure of Tongue River Dam. Besides providing this early warning, an additional objective is to minimize or eliminate danger to people or property located downstream of the dam.

The plan would need to be invoked under either of two potential emergency situations:

1. Failure of the dam has occurred or seems imminent.

2. A potentially hazardous situation is developing.

The plan is intended to provide instructions for notifying the proper authorities of a problem at the dam and is not intended to serve as an evacuation plan for notifying and evacuating downstream residents. Notifying and evacuating downstream residents are responsibilities of local authorities.

Persons living within 9 miles downstream of the dam likely would be flooded within the first 1.5 hours after a breach of Tongue River Dam. To facilitate that notification, a radio warning system has been installed between the dam and the Town of Birney. The warning receivers may be activated from the dam itself, from the dam tender's vehicle, from the Sheridan, Wyoming Police/Sheriff Dispatcher, and by the Rosebud County Deputy in Birney. A schematic of the emergency warning radio system is shown in **Figure 3-5**.

3.13.4 Housing

In 1990, there were 1,291 housing units on the Northern Cheyenne Reservation, of which 81 percent were occupied. Of the 1,045 occupied units, 59 percent were owner occupied and 41 percent were renter occupied. Approximately 76 percent of the housing units were single-family structures, 12

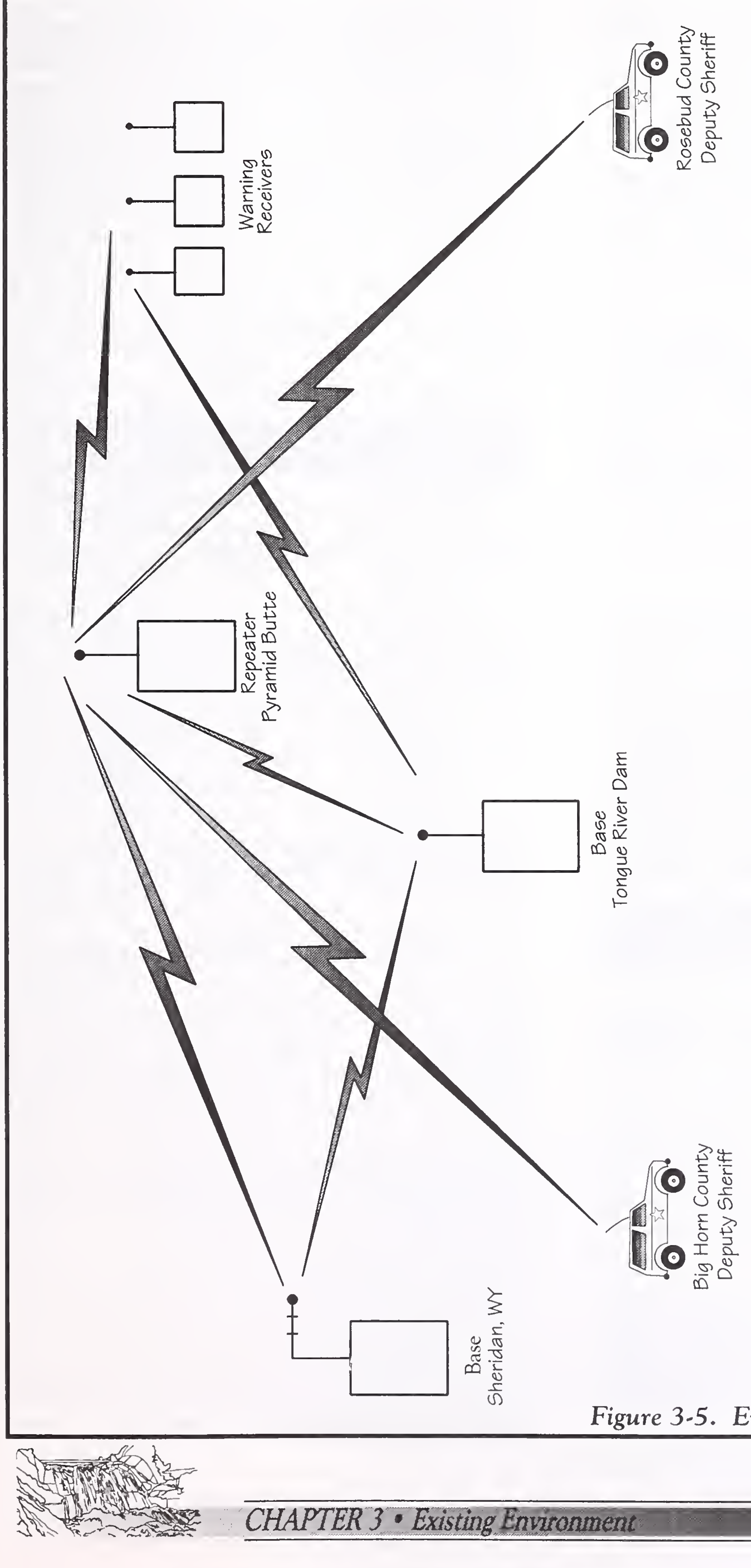


Figure 3-5. Emergency Warning Radio System

percent were multi-family units, 11 percent were mobile homes, and less than 1 percent were classified as "other" structures (U.S. Bureau of the Census 1991). Approximately 16.5 percent of the homes were built between 1985 and March 1990, 18.6 percent were constructed between 1980 and 1984, 39.6 percent were built between 1970 and 1979, 17.3 percent were constructed between 1960 and 1969, and 8 percent were built prior to 1969 (Montana Office of Indian Affairs 1994).

The majority of homes (estimated 80 percent) on the reservation are Housing and Urban Development (HUD) homes (Jerry Smith, Tribal Engineer, personal communication, December 2, 1994). Due to the construction of HUD homes, there are not a lot of mobile homes on the reservation (Barry Boler, Tribal Sanitarian, personal communication, December 2, 1994).

3.13.5 Population and Demographics

The population of Montana grew by 1.6 percent (12,375 individuals) during the 1980-90 decade, from 786,690 in 1980 to 799,065 in 1990. Sixteen counties in Montana experienced population increases during this 10-year period, ranging from 2.2 percent in Big Horn County to 17.7 percent in Gallatin County. The Northern Cheyenne Reservation is divided into Rosebud County and Big Horn County, with the majority of residents living in Rosebud County. Rosebud County ranked 11th among the 16 counties with population increases, with a 6.1 percent increase during the 1980-90 period, from 9,899 in 1980 to 10,505 in 1990. Big Horn County increased from 11,096 in 1980 to 11,337 in 1990 (U.S. Bureau of the Census 1991).

Total population of the reservation in 1990 was 3,923, an increase of 7.1 percent over the 1980 Census population. Lame Deer, the largest community on the reservation, had a population of 1,918 in 1990 (U.S. Bureau of the Census 1991).

In 1990, 90.3 percent of the population on the reservation were Native Americans, 9.3 percent were Caucasian, and less than 1 percent were classified as "other." Of the 3,542 Native Americans, 80.5 percent were Cheyenne.

The population of the reservation was almost evenly divided between males (50.2 percent) and females (49.8 percent). Forty-six percent of the population were 18 years of age or less, 31.8 percent were between 19 and 39 years of age, 17.9 percent were between 40 and 64 years of age, and 4.2 percent were 65 years of age and older. About 38 percent of the residents on the reservation 15 years old and older had never been married, 43.1 percent were married, 1.7 percent were separated, 5.7 percent were widowed, and 11.2 percent were divorced (U.S. Bureau of the Census 1991). Table 3-2 displays selected demographic characteristics for the Northern Cheyenne Reservation.

TABLE 3-2. Selected Demographic Characteristics Northern Cheyenne Reservation (1990)

Demographic Characteristic	Northern Cheyenne Reservation
Household Type and Relationship	
Family	93.7%
Non-family	5.8%
Group Quarters	0.5%
Total Persons	3,923
Household Type and Size	
1 Person	15.0%
2 Persons	18.6%
3 Persons	15.7%
4 Persons	16.8%
5 Persons	15.2%
6 Persons	8.7%
7 or more Persons	10.0%
Total Households	**1,045**

Source: U.S. Bureau of the Census 1991.

3.13.6 Economic Environment

The study area for the economic environment is defined as the Tongue River Basin, including Rosebud, Big Horn, Powder River, and Custer counties in Montana, and Sheridan County in Wyoming. Primary employment and income impacts would most likely occur to the Northern Cheyenne Indian Reservation, due to the Settlement Act of 1992 (**see Chapter 1**) and the Tongue River Dam Project Northern Cheyenne Labor Relation Accord and Employment Preference Agreement (commonly called the TERO agreement). The Act required an agreement for employment preference for the Northern Cheyenne Tribe and the TERO agreement set forth that preference; a target of 75 percent of employment on the project shall be from the Tribe.

Since it is assumed that the project would be large enough to attract a non-local or out-of-basin contractor who would then bring in the remaining 25 percent of skilled and administrative workers, little other employment and income effects would be felt in the basin off the reservation. Minor employment and income impacts may be felt in the remainder of the basin if local subcontractors were involved in the project.

3.13.6.1 Employment Trends

Employment trends in the Montana Tongue River Basin peaked (18,500 jobs) at the height of the energy boom in 1980, then declined 2.5 percent by 1990 (U.S. Bureau of the Census 1994). In 1990, basin agricultural-related employment comprised about 14 percent of total basin employment, while mining and manufacturing totaled 8 percent.

Mining jobs in the Tongue River Basin doubled from 1970 to 1980 with the construction of five major coal mines in the basin during this time period. In addition, construction jobs, related to coal mine development, nearly tripled from 1970 to 1980, before declining 50 percent by 1985, when coal development had ceased.

Service- and finance-sector employment in the basin increased by 63 percent between 1970 and 1990 and comprised 28 percent of total employment in the basin in 1990. Government employment in the Tongue River Basin increased by about 60 percent between 1970 and 1990, and accounted for one of every five jobs in the basin in 1990. Employment in the remaining major economic sectors in the Tongue River Basin changed very little over the 1970 to 1990 time period.

Employment in Sheridan County, Wyoming is similar to the composition of employment in the Tongue River Basin. In 1990, there were 12,946 jobs in Sheridan County, of which 8 percent (1,001) were related to agriculture, 22 percent (2,862) were in government, and 44 percent (5,695) were in the service and retail trade sectors. Sheridan County also has a number of residents who commute to work in Montana. In 1990, 515 residents of Sheridan County worked in Montana (U.S. Bureau of the Census 1994).

Most of the commuting employment was related to work at the Decker and Spring Creek coal mines in Big Horn County, Montana, where about 419 Wyoming residents worked (U.S. Bureau of the Census 1994). In addition to the commuting employment, recreational activities at the Tongue River Reservoir contribute to the creation of service and retail job employment in Sheridan County.

In 1993, the civilian labor force in the Tongue River Basin totaled 17,159 in the related Montana counties and 13,091 in Sheridan County, Wyoming. Unemployment levels in the basin are somewhat higher than the state average (7.8 percent as compared to 6.0 percent), primarily because of the higher than average unemployment rates in Big Horn and Rosebud counties. The Northern Cheyenne Reservation is located in Rosebud and Big Horn counties and, historically, there have been few employment opportunities on reservations.

Table 3-3 lists 1990 Census American Indian employment statistics for the Northern Cheyenne Reservation. As indicated, the unemployment rate for labor force participants was 31 percent, while the total proportion of non-working American Indians on the Northern Cheyenne Reservation (16 years old and over) was 60 percent. Government agencies employed the majority of workers on the reservations, where 40 percent of the employed Northern Cheyenne worked in 1990.

TABLE 3-3: Tongue River Basin - Northern Cheyenne Reservation Employment Statistics (1990)

	Northern Cheyenne Reservation	
Category	Number	Percent
Total American Indian Population -16 years old and over	2,044	100.0
Not in Labor Force	850	41.6
In Labor Force	1,194	58.4
In Labor Force: Employed	819	68.6
In Labor Force: Unemployed	375	31.4
Total Unemployed	1,225	60.0
Employment/Occupation: Agriculture	26	3.2
Employment/Occupation: Private Industry	444	54.2
Employment/Occupation: Self-Employed	18	2.2
Employment/Occupation: Government	331	40.4

Source: U.S. Bureau of the Census 1990.

3.13.6.2 Income Trends

Employment in the Tongue River Basin is dominated by the government sector which has grown steadily over the past 20 years. Nearly one-fourth (23 percent) of basin earnings now come from the government sector. During the same time period, agricultural-related earnings in the basin declined markedly. In 1970, agricultural earnings comprised nearly one-third (29 percent) of all earnings in the basin. By 1985, basin agricultural earnings had declined to 1 percent of all earnings in the basin, before increasing to 10 percent by 1990.

In 1990, earnings in Sheridan County, Wyoming, totaled $237.3 million (U.S. Bureau of the Census 1994). Farm earnings in Sheridan County were $6.0 million in 1990, while government earnings accounted for $67.5 million and service and retail trade earnings totaled $54.3 million. Per capita income in Sheridan County ($22,559) was higher than both the Montana state average ($16,227) and the Montana Tongue River Basin average ($14,590) in 1992.

Two of the counties in the Tongue River Basin had per capita incomes that were less than the state average. In particular, Big Horn County had a 1993 per capita income of $10,040, which was 33 percent less than the state average. One reason the per capita income in Big Horn County is lower than average is due to the high unemployment rate on both the Crow and Northern Cheyenne reservations, and the subsequent low median family income of American Indians. In 1990, the median family income of American Indians on the Crow Reservation was $14,031 compared to the basin median of $26,720 and the state median of $28,044. A similar situation exists in Rosebud County with the Northern Cheyenne Reservation, however the per capita income levels in Rosebud County are buoyed by the higher than average salaries paid at the mines and power plants located in the county.

3.13.6.3 Tongue River Basin Agricultural Economy

Farm-related employment in the four Montana counties that comprise the Tongue River Basin accounted for 13.5 percent of total employment in the basin during the period 1989-91 (**see Table 3-4**). This proportion was 50 percent higher than the 1979-81 statewide average of 8.6 percent. Basin farm employment increased slightly between 1979-81 and 1989-91, while statewide agricultural employment increased by 4.5 percent. Farm employment in the Tongue River Basin accounted for 7.0 percent of total statewide farm employment during 1979-81 and 6.7 percent during 1989-91.

Farm-related income in the Tongue River Basin averaged about 7 percent of total personal income in the basin during the period 1989-1991. This proportion was about the same as the average percentage reported from 1979-1981. Farm income in the basin declined slightly between 1980 and 1990. Most of this decline is attributable to factors such as drought and depressed farm prices in the late-1980s.

TABLE 3-4: Tongue River Basin - Agriculture Economic Baseline Data

Category	Average 1979-81	Average 1989-91	Percent Change	Percent of State 1979-81	Percent of State 1989-91
Total Employment	18,830	18,285	-2.9	4.8	4.3
Farm Employment	2,470	2,472	0.1	7.0	6.7
Percent of Total	13.1%	13.5%			
Total Personal Income ($000)	$500,530	$489,144	-2.3	4.6	4.1
Farm Income ($000)	$ 37,214	$ 35,745	-3.9	14.8	7.1
Percent of Total	7.4%	7.3%			
Total Ag Sales ($000)	$227,162	$163,153	-28.2	9.6	9.2
Livestock Sales	$172,924	$125,166	-27.6	13.1	12.1
Percent of Total	76.1%	76.7%			
Crop Sales	$ 54,238	$ 37,986	-30.0	5.2	5.2
Percent of Total	23.9%	23.3%			

Note: All dollar amounts expressed in terms of 1990 dollars

Source: U.S. Bureau of the Census 1994.

Agricultural sales in the Tongue River Basin averaged $163.2 million per year during the 1989-91 period, or about 9 percent of total agricultural sales in Montana. During 1989-91, livestock sales in the basin totaled $125.2 million and comprised three-fourths of total basin agricultural sales. Crop sales averaged $38.0 million and accounted for 23 percent of the basin's agricultural sales.

3.13.6.4 Public Sector Fiscal Conditions

The sectors of Montana's economy are taxed in a different manner and at varying rates. Sources for local government revenues in the Tongue River Basin are principally related to the property taxation of land, machinery, utilities, and the production of oil, gas, and coal. Rosebud County has four coal-fired electrical generating plants located near Colstrip, which account for nearly two-thirds of the property taxable valuation in the county. In addition, Rosebud and Big Horn counties tax the equipment used to mine coal, accounting for about 20 to 25 percent of property taxable valuation in the counties. Big Horn and Rosebud counties also receive local property tax revenues from production taxes on oil, gas, and coal. The production taxes received are distributed to local governments within the county based on prior mill levy levels associated with each government, including school districts.

The State of Montana also receives severance taxes from the production of coal in the Tongue River Basin. Through Fiscal Year 1993, state government had collected over $1.1 billion in taxes from coal production in the Tongue River Basin (Office of Legislative Fiscal Analyst 1993). At present, the state annually receives about $13.7 million in general fund taxes, $18.0 in trust fund revenues, and $6.6 million in other revenues from coal production.

The importance of agricultural property taxable valuation in the basin varies between counties, and is much more important in the non-coal producing counties. **Table 3-5** lists the 1994 agricultural-related taxable values for irrigated and non-irrigated farm land in the four counties in the Tongue River Basin. In 1994, irrigated land in Montana (1.66 million acres) had an average assessed valuation of $214 per acre and a corresponding taxable valuation of $8.25 per acre (Montana Department of Revenue 1994). Non-irrigated farmland in Montana (48.8 million acres) was assessed at $66 per acre, or 70 percent less than irrigated land. In the Tongue River Basin, irrigated land accounts for less than 2 percent of the total acreage in the basin, and about 13 percent of the taxable valuation related to agricultural land.

3.14 TRANSPORTATION

The reservoir is accessed by Secondary Highway 314 and County Road No. 380 (**see figures 2-4 and 3-6**). An unsurfaced road, hereinafter referred to as East Shore Road, begins at County Road No. 380 at the west end of the dam, crosses the dam, and continues south along the east side of the reservoir to access several cabin sites.

3.14.1 Local Roads

County Road No. 380 begins at Secondary Highway 314 just west of the central portion of the reservoir, continues to the dam and to its junction with Secondary Highway 566 at Four Mile Creek (**see Figure 3-6**). The length of the road, from Secondary Highway 314 to the dam, is about 7.5 miles. The

TABLE 3-5: Tongue River Basin – Land Taxable Valuation (1994)

	Irrigated Land		Non-Irrigated Land	
Category	Acres	Taxable Value ($00)	Acres	Taxable Value ($000)
Big Horn County	40,898	505	1,435,102	3,055
Custer County	25,319	321	1,808623	1,867
Powder River County	8,035	37	1,327,510	1,812
Rosebud County	27,480	332	2,348,908	2,571
Tongue River Basin	101,732	$1,195	6,920,143	$9,305

Source: Montana Department of Revenue 1993.

roadway is surfaced with a thin layer of gravel and is maintained by Big Horn County. The roadway includes four horizontal curves with a design speed of less than 20 MPH, seven horizontal curves with a design speed of less than 30 MPH, and five horizontal curves with a design speed of less than 40 MPH. There is one section of road near the dam and three additional shorter sections totaling 0.2 mile where vertical grades are about 10 percent and approximately 0.1 mile where grades are 13 percent. All other grades on the roadway are less than **8** percent. Sight distance is less than desirable in some areas. Traffic volumes on this roadway are shown on **Figure 3-6**.

East Shore Road is about 3 miles long and is an unimproved, one-lane road with a few informal turnouts. It is rough and not well maintained. The roadway includes many horizontal curves with a design speed of less than 20 MPH, steep vertical grades approaching 20 percent in some areas, and poor sight distance. Traffic on this roadway is estimated to be less than 10 vehicles per day with almost no large truck traffic.

3.14.2 Secondary Highways

Several secondary highways exist in the project area. These roads are eligible for state and federal funding for construction and are maintained by the counties. They are functionally classified as rural collector roads. Secondary highways in the project area are shown on **Figure 3-7** and include:

- Secondary Highway 338 (S-338), from I-90 near Sheridan to the Montana/Wyoming line. This section of roadway is approximately 15 miles long and is a two-lane roadway with an asphalt paved surface, recently reconstructed with adequate shoulder width. S-338 is located several miles south of the reservoir.

- Secondary Highway 314 (S-314), from the north terminus of S-338 at the Montana/Wyoming border to U.S. Highway 212 near Busby. This section of roadway is approximately 44 miles long and is two-lane with an asphalt paved surface ranging from 28 to 31 feet wide. S-314 parallels the west side of the reservoir for approximately 5 miles.

- Secondary Highway 484 (S-484), from S-314 near the south end of the reservoir to U.S. Highway 212 just east of Ashland. This predominantly gravel roadway is approximately 0.2 miles from the reservoir at its closest point and is separated from the reservoir by a railroad spur. Portions of this road are not included in the secondary highway system.

- Secondary Highway 566 (S-566), from S-314 northwest of the reservoir to Birney. This section of roadway is approximately 52 miles long and is two-lane with a gravel surface ranging from 24 to 28 feet wide. This roadway is several miles north of the dam.

3.14.3 Off-Road Travel

Substantial off-road travel occurs in the project area, particularly along the northwest shores of the reservoir in the recreation areas. Recreationists, ranchers, and others use the area, traveling in a variety of on- and off-road vehicles. There are many areas where two-track paths have evolved as a result of frequent motor-vehicle travel.

3.14.4 Railroads

Decker and Spring Creek coal mines are served by a Burlington Northern (BN) branch line that extends from the mines south into Wyoming to connect with the BN mainline from Huntley, Montana. This branch line is well-built and maintained and has a 30 MPH speed limit.

An average of about 15.4 million tons, or about 163,000 carloads, of coal per year were carried on this branch line from the mines in each of the years 1988 to 1991. Other traffic on the line is minimal -- in 1991, non-coal freight included no carloads originating and only 12 carloads terminating at the mines. In addition to the extensive coal-loading facilities at each of the mines, sidings that exist at the West and the East Decker mines may allow unloading of up to 20 and 10 carloads, respectively.

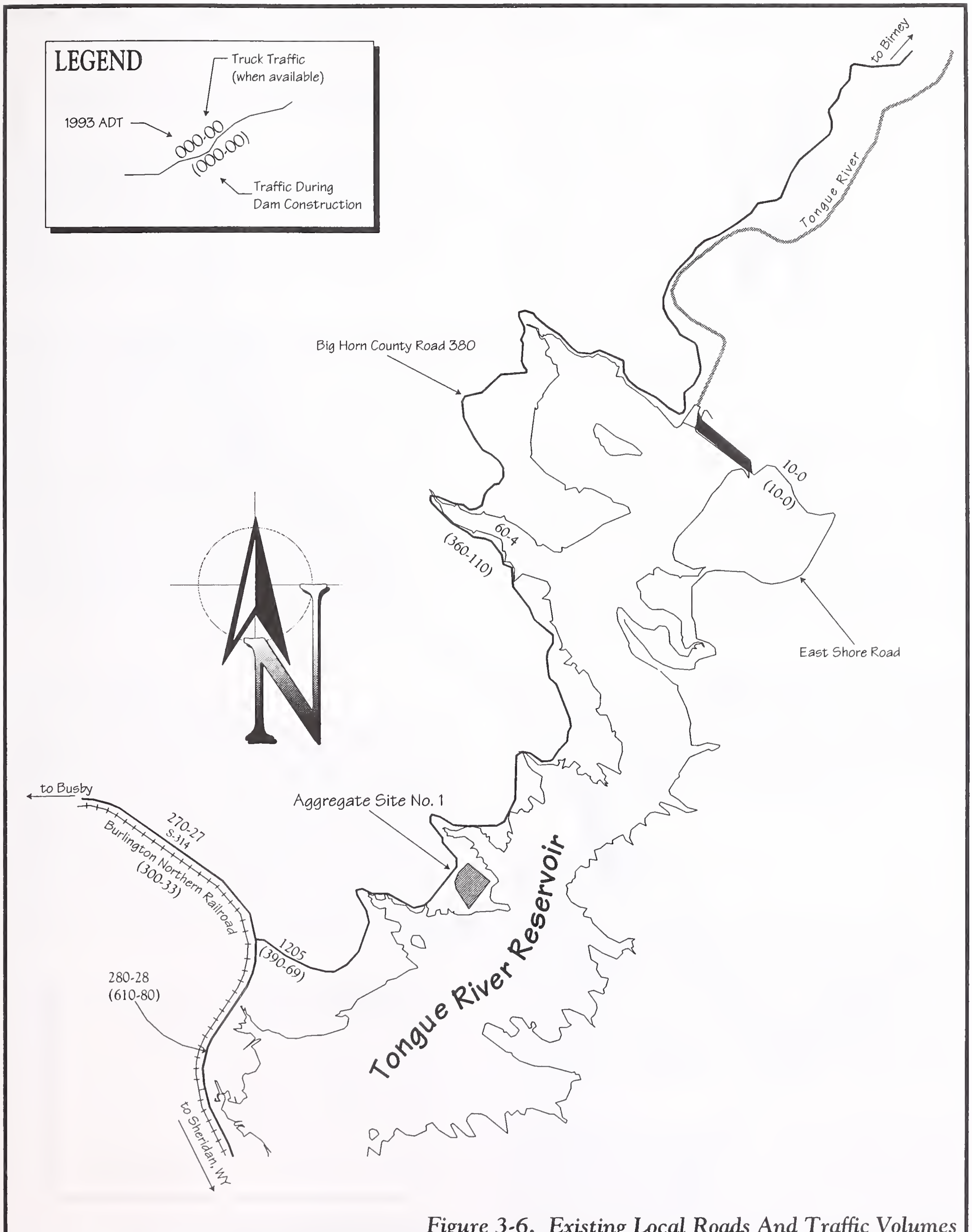


Figure 3-6. Existing Local Roads And Traffic Volumes

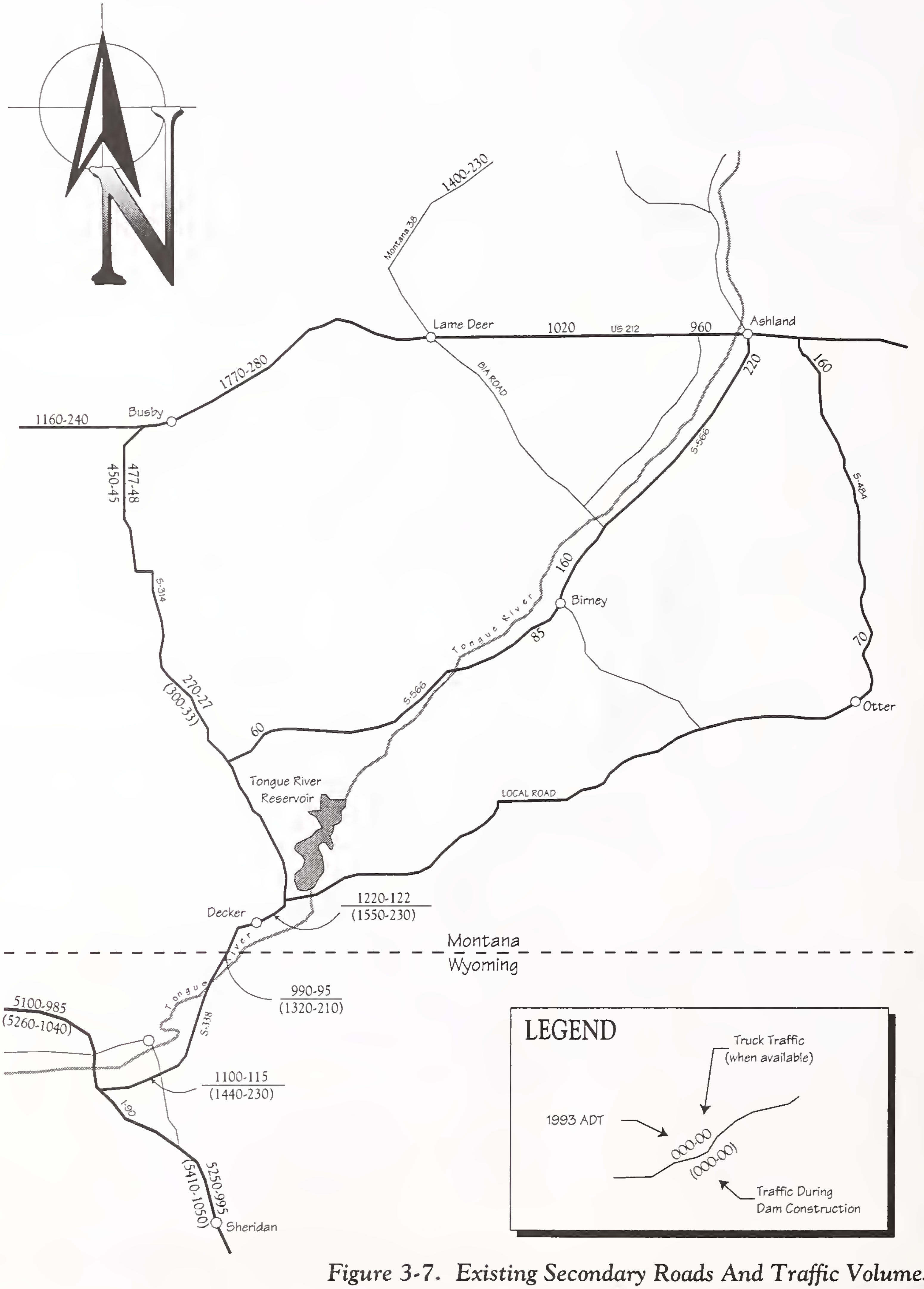


Figure 3-7. Existing Secondary Roads And Traffic Volumes

3.15 RECREATION

3.15.1 Tongue River Reservoir

Use of Tongue River State Park has steadily increased at an average rate of 15 percent annually since 1989 (DFWP fee revenue records; John Little, DFWP, personal communication, February 11, 1994). These figures reflect an increase in the awareness and popularity of the park as a regional recreation resource.

Visitors to Tongue River State Park typically arrive from origination points within a 100-mile radius of the reservoir. This would include Sheridan, Johnson, and Campbell counties in Wyoming, and Yellowstone, Custer, Big Horn, Rosebud, Powder River, and Treasure counties in Montana. A study conducted in 1991 by USBR suggests that the park's effective recreation season extends from May 15 to September 15. The state park currently receives an estimated 550,000 total visitor hours annually. A full description of the recreational opportunities in the study area is presented below.

3.15.1.1 Fishing

The Tongue River Reservoir supports substantial angler use. Estimates of annual use were 17,270 angler days in 1991 and 24,572 angler days in 1993 (DFWP 1991 and 1993). The Tongue River Reservoir is host to 11 warm-water game/sport fish species. DFWP's 1993 Creel Survey suggests that smallmouth bass, walleye, and crappie are the most popular species among anglers (DFWP 1994; Phillip Stewart, DFWP, personal communication, February 11, 1994).

The reservoir's limited depth and fluctuating water levels combine with the region's warm summer seasons to make conditions unsuitable for maintenance of a viable cold-water fishery -- despite the limited presence of rainbow and brown trout (P. Stewart, pers. comm., February 11, 1994). Cooler-water releases from the reservoir help to maintain a limited cold-water habitat immediately downstream from the existing spillway. Two thousand 7-to-8-inch rainbow trout are planted in the area each year. Although not widely recognized, this effort provides anglers a rare cold-water fishing opportunity within the immediate area of the Tongue River Reservoir.

Thirty-six percent of angler use on the reservoir was from a combination of shore and ice fishing according to the 1993 Creel Census on the Tongue River Reservoir. Tongue River State Park on the west shore, and the dam facility on the north shore, provide a majority of the public shore-fishing opportunities on the reservoir. The east shore and southern one-third of the reservoir receive occasional use from private landowners and trespass fishermen, but rarely are used in comparison to the west and north shores. Public access is restricted because of private ownership, mine development, and geographic constraints.

A majority of the reservoir's angler use (64 percent) is from motorized and non-motorized watercraft. Nearly all of the reservoir's navigable surface area is available for public use when water levels are at their maximum elevation. When water levels are low, some areas, especially at the southern tip of the reservoir, are not accessible by boat because of shallow depths, submerged vegetation, and subsurface debris.

The 1993 Creel Census estimates show that nearly half of the annual fishing pressure occurred in the months of May and June. Montana anglers making up 60 percent of the fishing pressure and Wyoming anglers comprise most of the remainder.

3.15.1.2 Boating

Motorized

The Tongue River Reservoir has no restrictions on the size or types of boats and/or motors. This means the reservoir is host to a number of different types of recreational boats including jet boats, jet skis, wave runners, pontoon boats, ski boats, fishing boats, speed boats, pleasure craft, and motorized rafts and canoes.

A recreation survey conducted in 1993 by DNRC found that nearly 90 percent of the visitors to the Tongue River Reservoir participated in some level of boating activity, making boating the most common recreational activity on the reservoir. The reservoir

currently experiences an estimated 175,000 boating hours annually. Most of this activity occurs between April 1st and September 30th.

Boating opportunities are dispersed uniformly across the northern two-thirds of the reservoir. The DFWP has reported concerns with traffic congestion in the narrow straits off Sand Point (John Little, DFWP, October 11-13, 1993). Reduced water levels to elevation 3,420 feet expose large flats on the tip of Sand Point and significantly narrow the passage for boats. The gradually sloping bench that forms Sand Point is also found intermittently around the reservoir's eastern perimeter. Large expanses of these exposed beaches are also found at Rattlesnake, PeeWee, and Campers points. They often contain stumps and submerged debris that pose hazards to boaters when the water level is low.

Two designated launch ramps are located at Campers Point. The ramps, one gravel and one concrete, experience significant traffic between May and July and are the subject of public concern regarding ramp congestion. Ramp congestion and the associated launch and loading delays have resulted in some launch activity directly from the shore in many of the park's "rustic" areas.

No public docking facilities are available on the reservoir. About five privately operated boat slips located at a floating dock at Campers Point Marina are available for marina-related activities. Because of the limited availability of docking areas and the expanse of public access, recreationists often prefer to anchor off-shore or dock directly on the beach near their respective land-based activity (e.g., day use site, campsite). However, public concern has been voiced regarding the inconvenience and hazards of insufficient docking facilities at the launch sites (ramps).

Non-Motorized

Non-motorized canoes, fishing boats, rafts, and sailboats also use the reservoir. Although less abundant, these vessels typically avoid the more populous areas on the reservoir and spend more time along the shore and in small coves where high-speed activity such as waterskiing and jet skiing is less frequent. Because of the reservoir's lack of secluded areas (i.e., small bays, backwater sloughs), frequent interaction between motorized and non-motorized boaters has caused some conflict between the two groups. This situation has been aggravated in recent years by reduced water levels.

3.15.1.3 Camping

Tongue River State Park is one of only four state parks (Tongue River, Cooney, Hell Creek, Medicine Rocks) in Montana exclusively hosting rustic camping opportunities. The rustic nature of the park is defined by four key elements: 1) non-designated camp sites, 2) minimal water supply -- central pump, 3) central trash receptacles, and 4) occasional fire rings (Doug Monger, DFWP, personal communication, December 8, 1993). Although abundant camp sites are forged within the park each year by the public, only a few are formally developed by the existence of fire rings and picnic shelters. **Table 3-6** provides a detailed breakdown of existing facilities at Tongue River State Park.

TABLE 3-6: Facilities Inventory - Tongue River State Park and Fishing Access Site

Facility	Rattle-Snake Point	Camper Point	Pee Wee Point	Sand Point	Neck Bay	Cormorant Bay	Down Stream Site	Total Number
Picnic shelters		4		2			3	9
Single toilets		3		2			2	6
Double toilets	1	1	1					3
Handicap accessible toilets		1		1				2
Picnic tables	9	49	24	22	4	2	8	118
Trash cans with holders	7	12	14	8	4	2	7	54
Fire rings	7	8	13	6			4	38
Well, pump house, 2 hydrants		1						1
Gravel boat ramp		1						1
Concrete boat ramp		1						1
Pay phone		1						1
3,200 square foot parking lot (gravel)		1						1

Source: DFWP 1994.

The undesignated use of the park's available camping areas resulted in significant deterioration of the natural vegetation and soil stability in the accessible areas near the reservoir. The lack of formal (signed and restricted) shoreline and campsite access routes provides for random access to most areas of Rattlesnake, Campers, PeeWee, and Sand points. Limited camping and water access occurs along the remainder of the reservoir's west shore where topography, vegetation, and landownership allow.

Informal camps are established in restricted, or privately held areas, such as Boathouse Point. However, the areas most intensively used for camping at the reservoir are in the state park at Rattlesnake, Campers, PeeWee, and Sand points (**see figures 2-4 and 2-12**). Level of use is in direct proportion to the availability of site facilities (e.g., restrooms, shelters), park road access, and proximity to water. Less intensive use occurs in the Neck and Cormorant Bay areas, and the fishing access site immediately downstream from the dam. DNRC (1993) found that nearly 83 percent of the visitors to the Tongue River Reservoir camped, making it the second most common recreational activity on the reservoir after boating.

The Tongue River State Park's rustic nature makes the exact delineation of camping areas very difficult. Since a majority of the areas between the county road and the water's edge are relatively level and experience some level of camping activity, the study team evaluated the number of acres available for camping on each of the areas described below (**Figure 2-4 and Table 3-7**). This calculation served as a baseline to identify the opportunities lost or gained in the **Chapter 4** analysis of environmental consequences.

TABLE 3-7: Acreage Available for Camping

Camping Opportunity	Acres From Existing High Water Level to Old Country Road	Acres From Normal Elevation (3,420 feet) to Old Road
Rattlesnake Point	77	90
Campers Point	60	81
PeeWee Point	31	44
Sand Point	83	109
Neck Bay	32	39
North Shore	19	25

Source: Figures developed by MME Corp. 1994.

3.15.1.4 Day Use

DNRC (1993) found that roughly 17 percent of the visitors to the Tongue River Reservoir used the site as a day use area only. Day use activities include picnicking, hiking, swimming, sun bathing, wildlife viewing, fishing, boating, and photography. Day users typically visit the area from within a 60-mile radius, including Sheridan and Buffalo, Wyoming and Hardin, Montana.

Most of the day-use activity occurs within Tongue River State Park and most accessible areas on the west and north ends of the reservoir. Occasional use in privately held areas is evident, although no exact information is available on the amount and seasonality of use.

3.15.2 Regional Recreation

3.15.2.1 Fishing

Lakes and Reservoirs

Eleven cold-water lakes or reservoirs are present within a 100-mile radius of the project; three in Montana and eight in Wyoming. All 11 host rainbow trout with a majority also containing cutthroat, brook, and brown trout. Four of the 11 lakes also host warm-water fisheries including crappie, yellow perch, channel catfish, sauger, walleye, and largemouth bass.

All 11 cold-water lakes and reservoirs are popular daily attractions for local recreationists. Nine serve as destination points for vacationing and overnight users. Each of the subject lakes receives moderate to heavy use by local and regional anglers. The cold-water lakes located along the Big Horn front and in the alpine regions are often inaccessible in the winter due to heavy snow and inclement road and/or trail conditions.

Ten warm-water lakes or reservoirs lie within the study area (excluding Tongue River Reservoir) -- four in Montana and six in Wyoming. None of the ten host all 11 warm-water species found in Tongue River Reservoir. Four of the ten lakes also host cold-water fisheries including brown, brook, and rainbow trout, as well as burbot.

All ten warm-water lakes and reservoirs in the study area are popular daily attractions for local recreationists. Approximately six are destination points for vacationing and overnight users. Each of the subject lakes receives moderate to heavy use by local and regional anglers.

Rivers and Streams

Eighteen cold-water rivers or streams are present in the study area -- two in Montana and 16 in Wyoming (including the Tongue River in Wyoming and its north and south forks). Sixteen of the cold-water rivers or streams in the study area host rainbow trout. Other species actively angled include brook, brown, and cutthroat trout, mountain whitefish, grayling, and burbot.

The lower reaches of all 18 rivers and streams are accessible by vehicle in the summer, with limited accessibility in the winter. Upper reaches of many rivers and streams may not be accessible by vehicle, but can be reached with proper knowledge of trails and conditions.

All 18 cold-water rivers or streams in the study area are popular daily attractions for local recreationists. Depending on the particular reach, these rivers/ streams receive minimal to heavy use by local and regional anglers.

Seven warm-water rivers or streams lie within the study area -- four in Montana and three in Wyoming. None of the seven warm-water rivers or streams host all the warm-water species found in the Tongue River below the reservoir.

All seven warm-water rivers or streams in the study area are popular daily attractions for local recreationists. Most of them are accessible year-round and receive moderate to heavy use by local and regional anglers.

3.15.2.2 Boating

Lakes and Reservoirs

Only three lakes in the recreational study area are substantial enough to host the types of motorized boating activity present on Tongue River Reservoir. Big Horn Lake, Yellowtail Afterbay, and Lake DeSmet are popular boating lakes with little to no restrictions on size or type of motors or activities. Each lies within 70 miles of the Tongue River Reservoir. Keyhole Reservoir, Buffalo Bill Reservoir, and Fort Peck Lake are also popular recreational sites near the study area that serve as boating destinations for recreationists. The three water bodies are 120, 150, and 180 miles away, respectively.

Many opportunities exist within the study area for non-motorized boating activity. However, Big Horn Lake, Yellowtail Afterbay, and Lake De Smet are the only three within the study area that are similar in size and character to Tongue River Reservoir. Smaller water bodies include Castle Rock Lake, Gillette Fishing Lake, Sibley Lake, Lake Elmo, Lake Josephine, and Park Reservoir.

Rivers and Streams

Motorized boating opportunities in the region are limited. Five rivers similar to the Tongue River are found within the recreation study area. The Powder, Big Horn (above and below Yellowtail Dam), Little Big Horn, Shoshone, and Yellowstone rivers all host similar motorized boating opportunities at points throughout their reaches. Although water quality, turbidity, volume, and flow vary between these rivers, each would serve as an adequate alternative to motorized recreation on the Tongue River.

Non-motorized boating opportunities similar in character to those currently found on the Tongue River in Montana are more abundant than those for motorized. In general, non-motorized opportunities are the same as those identified for motorized recreationists, but also include many tributaries of each.

3.15.2.3 Camping

The only camping opportunities within the study area that offer water and are similar in character to the Tongue River State Park are those found on Big Horn Lake, Lake DeSmet, and Keyhole Reservoir. None of these areas offer the rustic camping opportunity exhibited at the Tongue River State Park.

For those camping along the river below the dam, opportunities of similar character in the study area include developed and rustic campsites along the Powder, Big Horn (above and below Yellowtail Dam), Little Big Horn, Shoshone, Greybull, and Yellowstone rivers. Clear, Crazy Woman, Little Powder, Pumpkin, and Rosebud creeks also offer camping opportunities yet lack the volume of water that contributes to the recreational experience along the Tongue River.

3.15.2.4 Day Use

Day uses are available at many locations in the study area. Those similar in character to the Tongue River Reservoir are those found on Big Horn Lake, Lake DeSmet, and Keyhole Reservoir.

Opportunities for day use activities along the rivers of similar character in the study area are found along the Powder, Big Horn (above and below Yellowtail Dam), Little Big Horn, Shoshone, Greybull, and Yellowstone rivers. Clear, Crazy Woman, Little Powder, Pumpkin, and Rosebud creeks also offer day use opportunities yet lack the volume of water that contributes to the recreational experience along the Tongue River.

3.16 LAND USE AND OWNERSHIP

Land adjacent to the reservoir is currently open space, supporting crop and livestock production, and recreational uses. Most land constituting the shoreline of the reservoir is held by DNRC, acquired by the State Water Conservation Board for purposes of reservoir operation when the original dam was built. Where DNRC does not own land adjacent to the reservoir, the agency has acquired flood easements or other legal agreements from public agencies or private landowners for reservoir operation.

Land ownership around the reservoir is shown on **Figure 3-8**. Aside from DNRC (Water Resources and Trust Lands Management Divisions), Bureau of Land Management (BLM), Northern Cheyenne Tribe, and private ownership is held here. BLM, DNRC, and the Tribe maintain livestock leases on their lands (Sally Hampton, Bureau of Land Management, personal communication, December 6, 1994).

Tongue River State Park is located on land owned by DNRC. Park facilities are described under ***Recreation***. In addition, a marina run by a concessionaire and serving the recreating public is located about the mid-point of the west side of the reservoir on land owned by DNRC.

3.16.1 Coal Mines

Decker Coal Company owns and operates coal mines on land adjacent to Tongue River Reservoir (**see Figure 2-4**). These are open-pit mines which use large equipment to remove overburden and expose buried coal seams. Removal of water from open pit coal mines is a necessary operation. West Decker Mine is located immediately to the west of Montana Highway 314 near the west shore of the reservoir and has been in operation since 1972. Mining has been ongoing in a series of long horseshoe-shaped outer pits that have progressed from east to west. The West Decker mine includes a railroad coal load-out facility and siding. The West Decker Mine is being extended to the north. Current plans indicate that the north extension of West Decker Mine will use the railroad coal load-out and equipment maintenance facilities at the West Decker Mine.

The East Decker Mine is located directly east of the West Decker mine on the east shore of the reservoir. The East Decker Mine began operations in the late 1970s and consists of north and south pits that have progressed from west to east. The north pit is currently inactive. The facilities at the mine include a railroad coal load-out, equipment maintenance shops, and most of the Decker Coal Company offices.

3.17 CULTURAL RESOURCES

3.17.1 Cultural and Historical Background

Cultural resources are the physical remains of peoples' past use of an area, as well as certain locations where no physical remains are present.

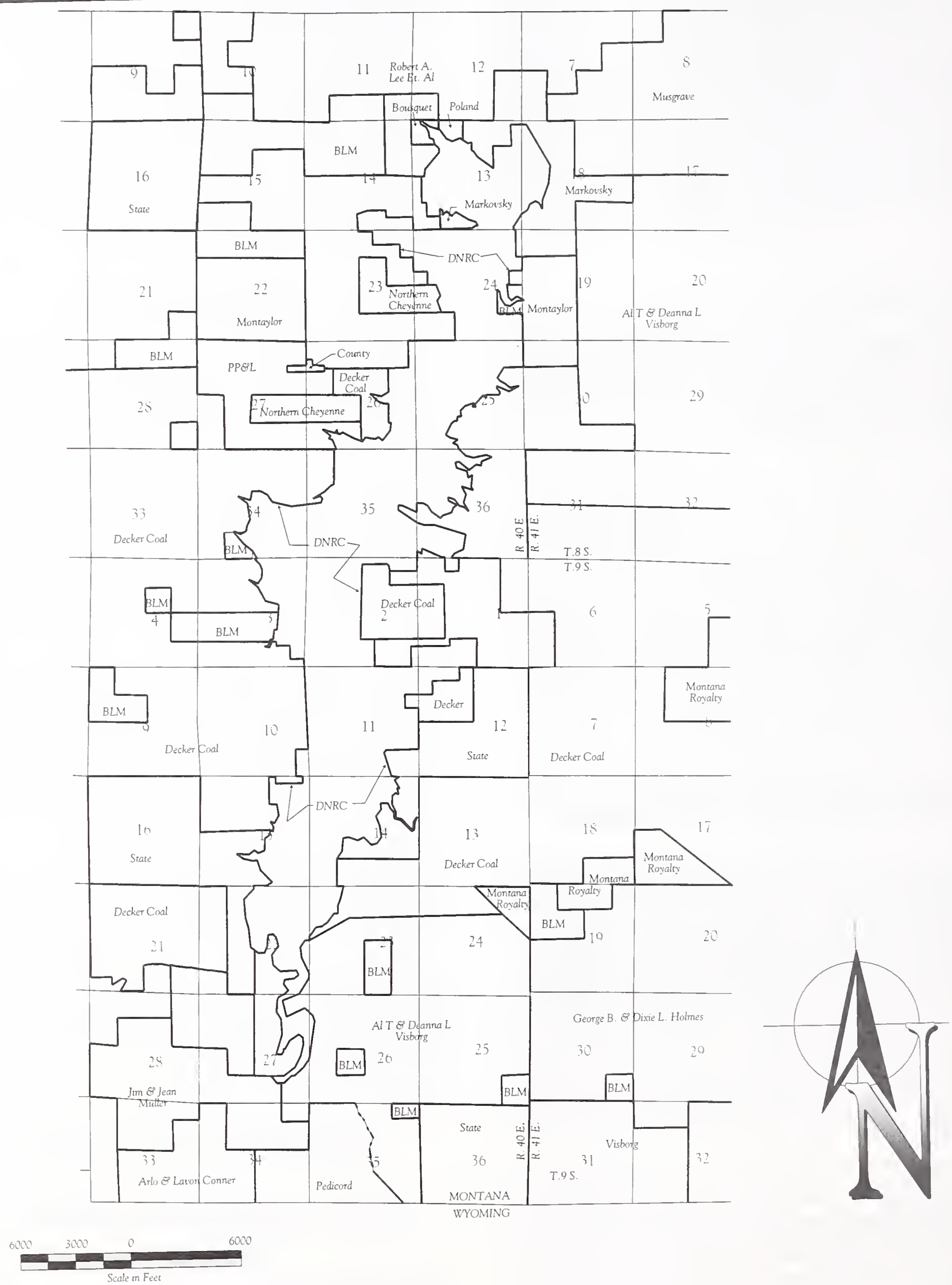


Figure 3-8. Landownership Around Tongue River Reservoir

Cultural resources include sites, buildings, structures, districts, objects and landscapes. In addition to containing a record of past human use or belief, they can symbolize peoples' continuing relationship to the area. Section 106 of the National Historic Preservation Act of 1966 as amended (16 USC 470)(NHPA) along with the implementing regulations, 36 CFR Part 800, require USBR to consider the effects of an undertaking (i.e., project) on cultural resources.

Every ethnic group interprets cultural resources in terms of their group's traditional cultural values and beliefs. Native Americans in southeastern Montana tend to view cultural resources as part of an interrelated system that has both physical and spiritual characteristics that must be respected. Euro-Americans in the area tend to view cultural resources as sources of information for study of the past, and as reminders of historical events and accomplishments.

These two world views result in different definitions of cultural resources and different evaluations of which cultural resources are important or significant. For example, lithic scatters are defined by archaeologists working in the western scientific tradition as a location containing evidence of past tool making/use. Archaeologists regard a lithic site as important or significant if it contains information about how tools were made or used in the past. Northern Cheyenne, Crow, Northern Arapaho, Eastern Shoshone and Minneconjous traditionalists, on the other hand, view lithic scatters as evidence that past people found a location to be both physically and spiritually compatible. No exact physical boundaries are placed on the site. Instead it is seen as a node in a network of interrelationships between people and their physical/spiritual environment. The site's significance to the Native Americans lies not only in that it marks a place of past compatibility, but also in the fact that it signals that people today continue in this relationship and hence must respect the area.

Local ethnic groups with an ongoing interest in the cultural resources of the Tongue River project area are the Northern Cheyenne, Crow, and Teton Sioux (primarily, the Minneconjous) and Euro-Americans (Peterson, Ibanez, and Brownell 1995). The Tongue River basin is also important to the history and culture of nearby groups such as the Eastern Shoshone, Northern Arapahoe, and the other western Sioux tribes.

Southeastern Montana, including the Tongue River area, is deceptively easy to characterize in terms of cultural resources. It was inhabited throughout prehistory (the last 12,000 years) by semi-nomadic hunters and gatherers. During the last 4,000 years the primary focus of hunting was the buffalo. The dominant prehistoric site type in the area is the surface lithic scatter, the debris left over from the manufacture and repair of chipped stone tools. Southeastern Montana has a high density and diversity of readily available rock types (e.g., porcellanite, cherts, quartzites, Tongue River silicified sediment, silicified marl) that were viewed as desirable for tool making by prehistoric peoples. There are probably more lithic procurement sites (small scale quarries) in southeastern Montana than in any other similar sized area in North America (Deaver and Deaver 1988).

Other common prehistoric site types found in the area are stone feature sites, primarily tipi rings and cairns (rock piles). Rare prehistoric site types found in the area include pictograph/petroglyph sites, bison kill/processing sites, vision quest sites, rock shelters, and sites containing ceramics (Deaver and Deaver 1988).

In the last 200 years of recorded history, the Crow, Eastern Shoshone, Northern Cheyenne, Northern Arapaho, and various bands of the Teton Sioux camped, hunted, and battled in the project area. Also during the last 200 years, Euro-Americans moved into the area. Their primary strategy of adaptation has been ranching/farming. As in other areas of eastern Montana, many attempts were made to engage in small scale (160 to 640-acre) ranching/farming but most were unsuccessful. These attempts were responsible for producing the most common historic site type in the area -- the homestead. Other historic site types found in the general project area include dumps, public buildings, rural towns, railroad grade, monument localities (graves, commemorative markers) and rock art sites (historic graffiti). The

relatively low forage productivity of the area that limited the size and distribution of the prehistoric hunters and gatherers has also limited the success of the historic ranching adaptation to those who can control extensive amounts of grass.

Cultural resources that could be effected by the project were evaluated to determine if they meet the criteria for listing in the National Register of Historic Places (National Register). The National Register is a listing of buildings, structures, objects, sites, or districts important in local, state, or national history. The Determination of Eligibility for each cultural resource that may be effected by the project was made in consultation with the Montana State Historic Preservation Officer as required by 36 CFR Part 800. The Northern Cheyenne Tribe and the DNRC concurred with Reclamation's Determination of Eligibility.

Letters, personal contacts, public meetings, and requests for comments on the draft EIS and the Cultural resources inventory report (Peterson, Ibanez, and Brownell 1994) were used to determine interest in the proposed project's impacts on cultural resources. As a result of these efforts, the Crow Tribe, Medicine Wheel Coalition and the Bureau of Land Management, Miles City District were identified as "interested persons" as defined in 36 CFR Part 800.2(h). The concerns of interested persons will be specifically addressed throughout the Section 106 consultation process. Native American individuals and groups were also consulted to identify possible concerns relating to traditional religious practices in the project area that would be protected by the American Indian Religious Freedom Act of 1978.

In 1992, 1994, and 1995 archaeologists inventoried the following areas: the 400 acres to be inundated by the proposed 4-foot raise of the reservoir water level, road reroutes, and potential wetland and campground development areas (**see Figure 2-4**). Also inspected for cultural resources were the two parcels of land that were transferred from BLM stewardship to the Northern Cheyenne Tribe, specific historic locations related to original dam construction and potential staging, borrow, and waste areas. A total of 3,500 acres were inventoried in 1992, and 80 acres were examined in 1994 (Peterson, Ibanez, and Brownell 1995). In addition, possible road realignments were surveyed in the fall of 1995 (Rennie 1995).

Members of the Northern Cheyenne Cultural Commission inspected selected sites for traditional cultural concerns and inventoried the entire project area for ethnobotanical concerns (Peterson, Ibanez, and Brownell 1995; Aaberg and Tallbull 1993).

Fifty-eight sites (41 Native American and 17 Euro-American) were found in the project area (Peterson, Ibanez, and Brownell 1995). The 41 Native American sites in the proposed project area include 30 lithic scatters, three lithic procurement sites, three tipi ring sites, four other stone feature sites, and one bison kill. The 17 Euro-American sites include nine farmsteads, four dumps, one community, one railroad grade, one road, and one dam. Consultation with the State Historic Preservation Office (SHPO) resulted in seven sites being determined eligible for listing in the National Register of Historic Places. (The Lee Homestead, site 24BH2349 was listed in the National Register in 1981.) Sites that were not determined eligible for listing in the National Register failed to meet the minimum criteria and/or had been severely damaged or destroyed by modern activities.

24BH591

Site 24BH591 consists of a stone ring complex and lithic scatter found on two bluff tops separated by a saddle. Construction of the Spring Creek Railroad in the 1980s destroyed 10 of the 41 stone rings, a stone structure with an in situ support beam, a driveline, and part of the lithic scatter. Ethnographic studies conducted as part of the Tongue River Dam cultural resources inventory demonstrated that is site is a traditional cultural place for the Northern Cheyenne people. The vicinity is associated with Chief Two Moons, an important 19th century leader and warrior. The general site location is associated with spirit beings recognized by the Northern Cheyenne.

24BH2613

Site 24BH2613 is a sparse lithic scatter located on the edge of a sandstone bluff and buffalo processing area below. The site is considered a Traditional

Cultural Property of the Northern Cheyenne Tribe and the Crow Tribe. It is associated with broad patterns of history, representative of one type of buffalo jump that may have been used by the Northern Cheyenne, and has high potential to yield information important to prehistory. Site 24BH2613 is viewed as having sacred/spiritual significance by the Northern Cheyenne. The Crow as well as the Northern Cheyenne have requested that they be kept involved with any further work at the site.

24BH2317

Site 24BH2317 is a large lithic scatter and stone ring site located on Rattlesnake Point on the west bank of Tongue River Reservoir. The site ranges in elevation from 3,412 to 3,500 feet above sea level. Extensive archeological testing indicates that 24BH2317 would yield information important to understanding the region's prehistory.

24BH2589

Site 24BH2589, the Tongue River Dam was significant to the development of water conservation projects by the State Water Conservation Board and Federal Public Works Administration funding in the 1930s.

24BH2271

Site 24BH2271, the Shreve Homestead has a strong historic association with early land settlement in the Lower Tongue River in Montana from 1886 to 1938. It has a fine collection of historic buildings that all illustrate skilled construction methods used by early settlers for both log and stone masonry. Archaeological testing confirms the potential of this site to yield information important to the homesteading era in Montana.

24BH2349

Site 24BH2349, the Lee Homestead, was listed in the National Register in 1981 because of its association with early homesteading in the Tongue River valley. The site consists of a cluster of homestead era buildings and associated features. The setting was extensively affected by the construction of the Tongue River Dam between 1937 and 1939. Construction operations were centered on the flat bottom land adjacent to the homestead.

24BH2601

Site 24BH2601 is the so called shanty town built to provide goods and services to the workers building Tongue River Dam in the late 1930s. Located along Leaf Rock Creek on patented Lee Homestead land, the site consisted of a bar and dance hall and possibly three other structures. After the dam was built, the bar/dance hall building was sold and the materials salvaged for use in other locations. A frame building was moved downstream of the dam in 1948 and used as schoolhouse. The other buildings deteriorated over time. Although the site lacks surface physical integrity it has retained the subsurface physical integrity of the associated archeological deposits. Archeological testing indicated the site has potential to yield important information on temporary communities established to service the construction crews.

In addition to the three Native American sites determined eligible for the National Register, three other sites were identified as having intangible spiritual attributes associated with traditional Native American religious beliefs. These include rock cairns recorded as sites 24BH2594, 24BH2595, and 24BH608. At the time the cultural resources inventories were done, 24BH608 and 24BH2595 were thought to be in areas that would be unaffected by the project so they were not evaluated for National Register eligibility. Site 25BH2594 was tested and determined ineligible for the National Register; however, the State Historic Preservation Officer disagrees with this assessment. USBR is now in discussions with the SHPO in order to resolve the National Register eligibility of 24BH2594.

Recently completed preliminary engineering drawings now show that sites 24BH2594 and 24BH2595 may be closer to proposed road realignments than previously known. A field inspection of the proposed road right-of-way by archeologists from USBR and DNRC will be made during the next snow-free period. A determination of effect, as required by 36 CFR Part 800.5 will be made if the sites fall within the proposed right-of-way.

Sixty-two plant species were identified that have ethnic significance and ongoing use for the Northern

Cheyenne (Aaberg and Tallbull 1993). None are restricted to habitat below elevation 3,428.4 feet, the proposed high water mark for the modified reservoir. Generally, these plants are widely distributed around the Tongue River Reservoir. Most of these species are easily accessible in the general area.

3.18 NOISE

Noise can be characterized as unwanted, unpleasant sound. It can cause hearing losses, interfere with speech communication and the performance of complex tasks, and disturb sleep. Noise may be either intermittent or continuous, steady, or impulsive. It can result from a broad range of sources and frequencies bleeding together, or from one specific sound. The human response to noise is diverse and varies with the type of noise, time of day, and sensitivity of the individual. The range of magnitude from the faintest to the loudest sound humans can hear is so large that sound pressure is expressed on a logarithmic scale in units called decibels. To simulate how humans hear various frequencies of sounds, the overall frequency spectrum is measured as A-weighted decibels (dBA). Loudness, compared to physical sound measurement, refers to how individual humans subjectively judge a sound.

A change in sound level of 10 dBA is usually perceived by the average person as a doubling (or halving) of the sound's loudness. This is true for loud and soft sounds. For example, a gas lawn mower at 100 feet would be about twice as loud as heavy traffic at 300 feet (**see Figure 3-9**). Noisy urban daytime sounds would be perceived as being about four times as loud as heavy traffic at 300 feet.

Noise levels from traffic depend on volume, speed, percentage of trucks, topography, vegetation, and distance from the roadway to receptor. Generally, an increase in volume or speed will increase traffic noise levels. For a line source such as roadway traffic, noise levels will decrease 3 dBA over hard ground (concrete, pavement) or 4.5 dBA over soft ground (grass) for every doubling of distance between the roadway and receptor. For a point source such as stationary construction equipment, noise levels will decrease 6 dBA for every doubling of distance.

3.18.1 Roads and Highways

Estimated existing Leq noise levels along several roadways in the project area are shown on **Table 3-8**. (Leq is a sound level equivalent to expected average noise.)

3.18.2 Construction Staging Area

It is estimated that existing Leq noise levels at the site of the proposed construction project range from 35 to 40 dBA. These are considered normal outdoor background noise levels in an open space setting.

3.18.3 Tongue River State Park

Existing noise levels within the Tongue River State Park are estimated to be approximately 35 to 40 dBA.

3.18.4 Sheridan Residential Area

Existing noise levels in the residential areas near the railroad sidings in Sheridan, Wyoming, are estimated to be approximately 55 to 60 dBA.

TABLE 3-8: Existing Noise Levels (in dBA) Along Roadways

Roadway	Location	Distance from Centerline *(feet)* 50	100	150	200
S-314	Decker	65	62	60	59
S-314	South of Road 380	59	56	54	53
Road 380	Between S-314 and Aggregate Site No. 1	47	44	42	41
Road 380	Between Aggregate Site No. 1 and Dam	45	42	41	39

Source: Estimated by Morrison-Maierle/CSSA 1994.

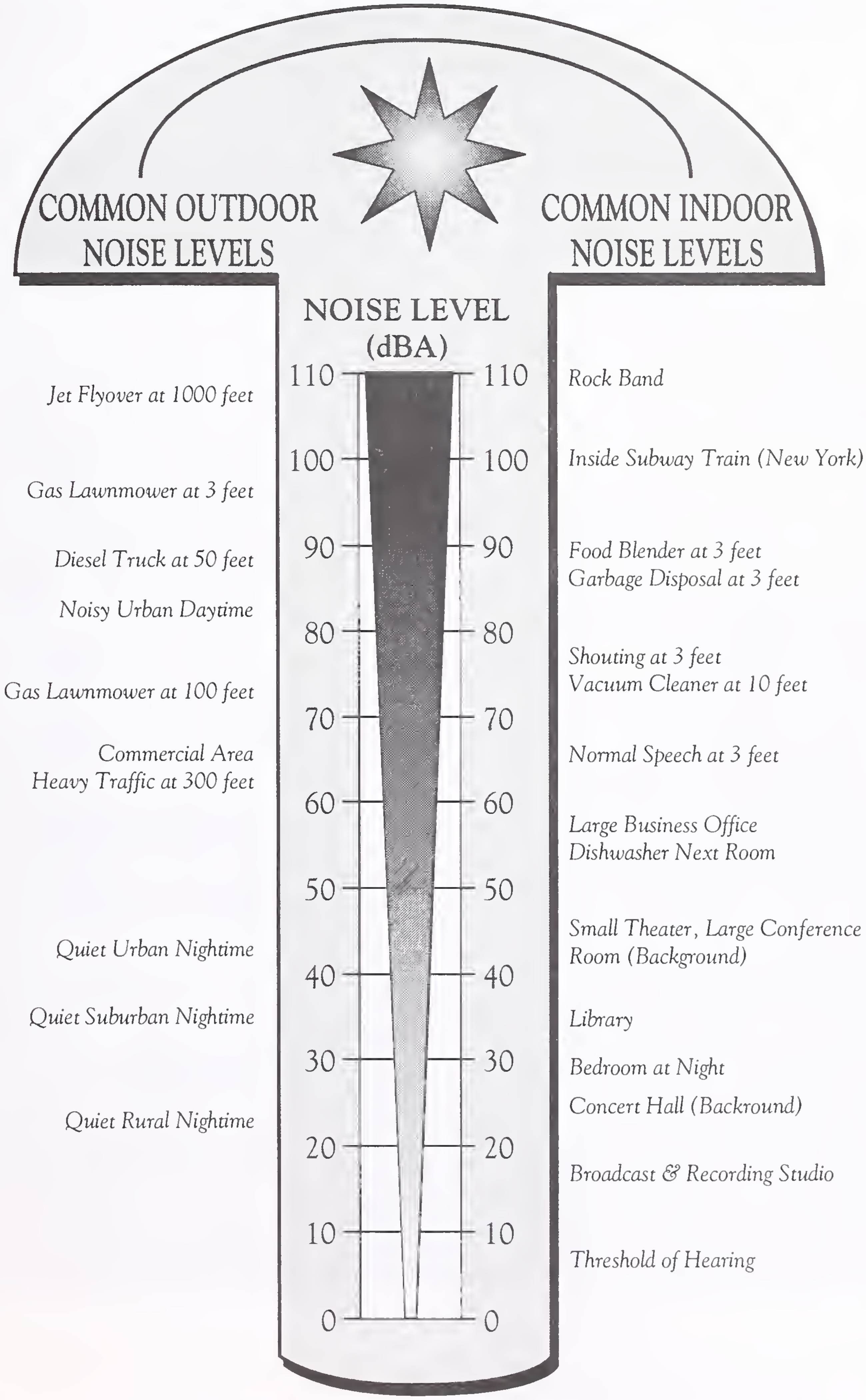


Figure 3-9. Comparitive Noise Levels

3.19
VISUAL RESOURCES

The project area is located in the Tongue River Valley, formed when the river and its tributaries eroded through parts of the Fort Union Formation. Tongue River flows from the mountains onto an open agricultural valley until reaching the reservoir. Just upstream of the river's entry into the reservoir, the largely undisturbed landscape is broken by the East and West Decker coal mines on either side of the river (**see Figure 3-10**). These mines have disturbed a substantial area adjacent to the upper reservoir, serve as a major contrast to the surrounding landscape, and are visible from the upper reservoir.

Topography surrounding the reservoir ranges from the flat river valley and benches to surrounding steep and eroded terrain (**see figures 3-10 and 3-11**). Montana Highway 314, County Road No. 380, and the BN spur line are located within a short distance of the reservoir. These features have been built using typical cut-and-fill construction methods, some sections of which are visible from the shoreline.

The reservoir is about 8 miles long and 1 mile wide (**see Figure 3-12**) with depths up to 90 feet. Reservoir margin ranges from shallow, barren mudflats at the upper end to gently sloping silt, sand, and gravel beaches to several areas with steep, rocky slopes. The reservoir margin includes a variety of vegetation ranging from relatively dry grassland and shrubland, punctuated by small stands of juniper and ponderosa pine, to riparian forest with a typical diversity of cottonwood, green ash, and box elder and a diversity of deciduous shrubs and grasses. The reservoir margin is a distinct visual feature with largely barren slopes formed by the reservoir and resulting wave action meeting the natural topography and vegetation at about the spillway elevation (**see Figure 3-13**). During periods of low flow into the reservoir and during drawdowns, the barren margins between the water level and vegetation expand considerably, reducing the scenic quality of the area.

The existing dam site spans about 1,800 feet across the stream valley at a height of 91 feet. The dam is prominent when viewed from the stream valley immediately below (**see Figure 3-14**). However, public access to this viewpoint is limited and the visibility of the dam is limited to about 0.5 mile downstream. The dam is less prominent when viewed from a boat on the reservoir. Viewers can see the dam's riprapped rock embankment above the reservoir water level (**see Figure 3-13**). The spillway is most visible when viewed from the west abutment or the downstream channel near the Tongue River Canyon fishing access site. From this viewpoint, one can see the concrete spillway chute and stilling basin. The spillway is not highly visible when viewed from the reservoir; views are limited to the abutment walls and the spillway crest when the reservoir is drawn down. The most visible feature of the low level outlet works is the gate house located near the centerline of the west end of the dam embankment. The intake structure is normally submerged in the reservoir and the outlet structure exits along the centerline of the spillway chute near the toe. The historic Lee Homestead structures are directly north of the dam embankment (**see Figure 3-14**).

Typical views of Tongue River State Park are of grassy flats, bisected by an informal network of roadways and occasionally interrupted by vegetation and/or park facilities, such as picnic tables (**see Figure 3-15**). Pike Pond is a 33-acre impoundment immediately adjacent to the southwest side of the reservoir, but separated from it by a dike (**see Figure 3-15**). The pond is not readily distinguishable from the surrounding landscape, partially because it does not support much high-growing vegetation.

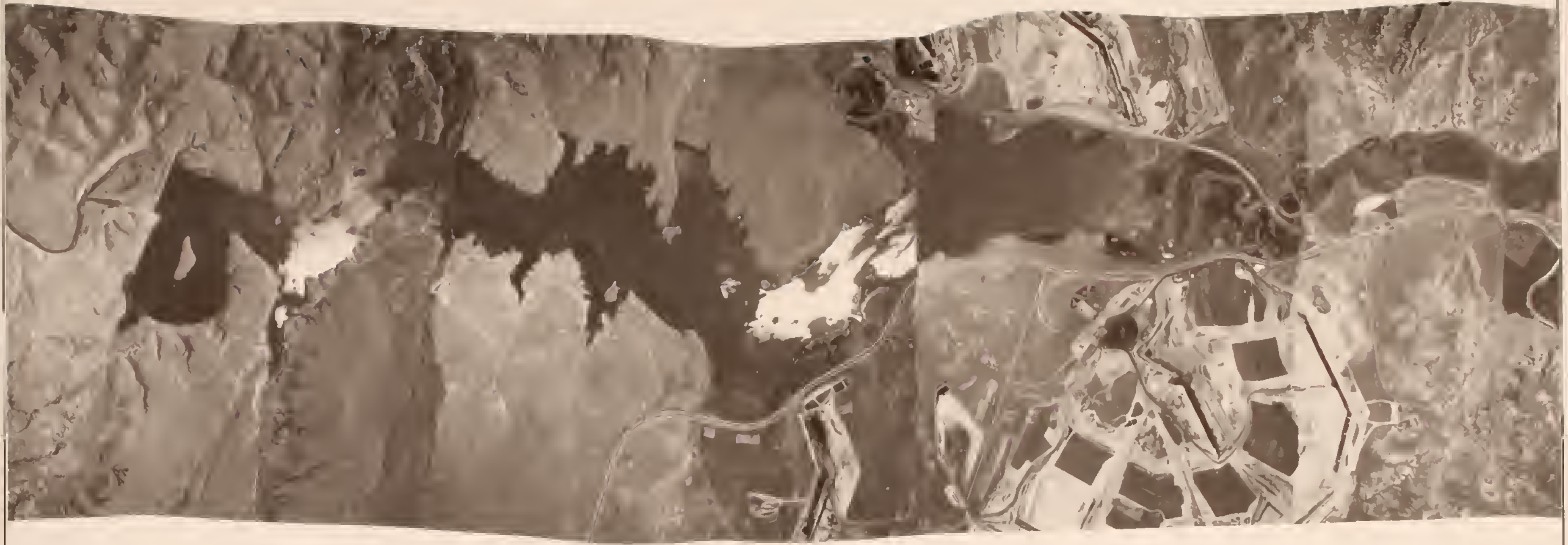
From the reservoir, the river flows northeast from the project about 190 miles to its mouth on the Yellowstone River at Miles City. The valley immediately below the dam is confined to a width of 0.25 mile with steep terrain on either side. The Tongue River Canyon fishing access site is on a bench on the west side of the river, about 0.25 mile from the toe of the dam. This site, the existing waste area, and County Road No. 380 constitute about 5 acres of disturbed area in the viewshed.

Looking North with West Decker Coal Mine in foreground

Figure 3-10. Oblique Aerial Photograph of Upper Reservoir Area

Looking South with Tongue River Dam in foreground

Figure 3-11. Oblique aerial photograph of lower reservoir area



NOTE

Water level in this photo is approximately at maximum reservoir pool level of 3424.4

Photo composited from 7/8/92 flight by Horizons, Inc

Figure 3-12. 1992 Aerial Photograph of Reservoir Near Elevation 3424 Feet

Photo showing typical reservoir margin

Photo showing upstream dam face

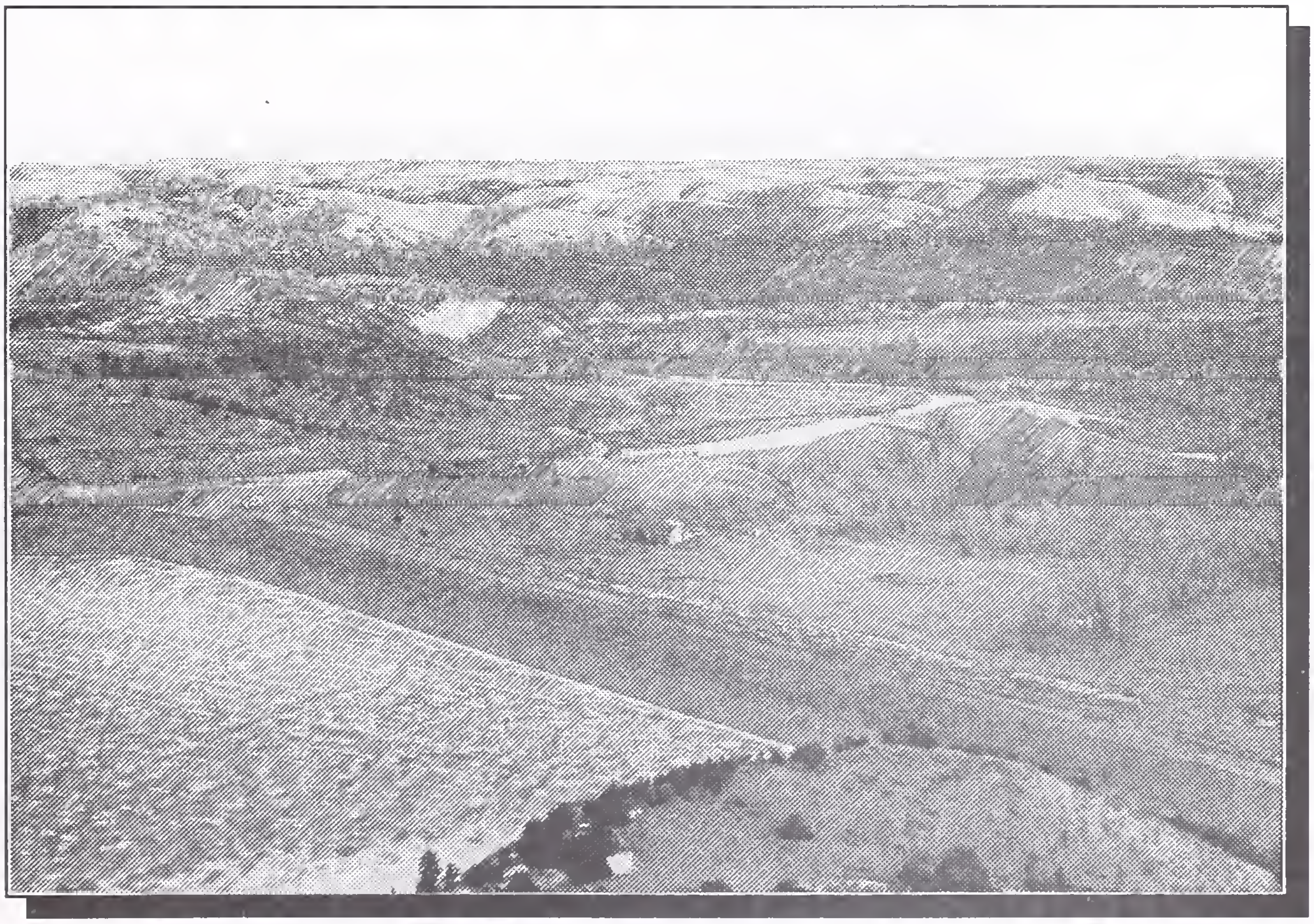


Figure 3-13. Photographs of Typical Reservoir Margin & Upstream Dam Face

Photo showing historic Lee Homestead structures downstream of dam

Photo showing downstream dam face

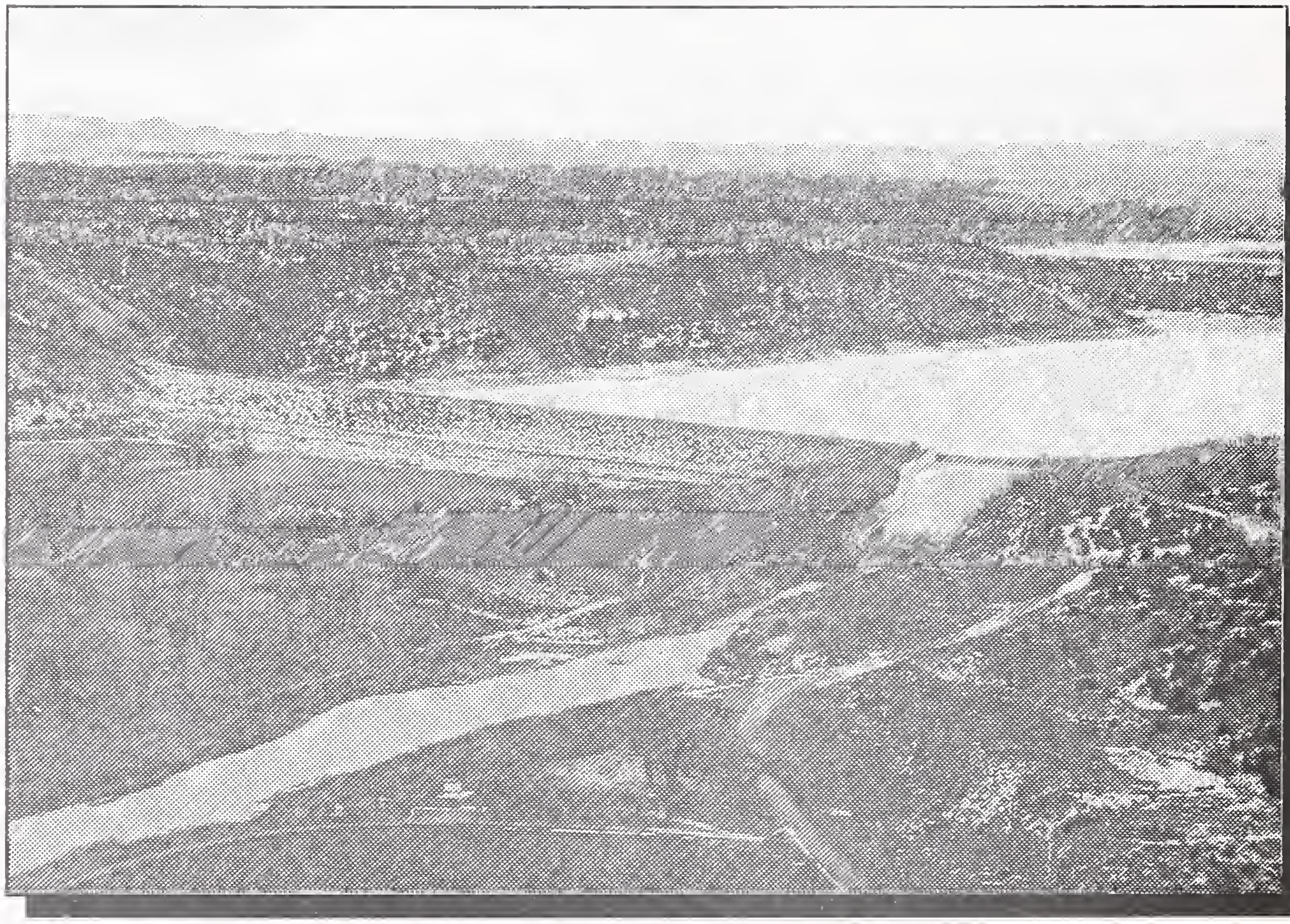


Figure 3-14. Photographs of Historic Lee Homestead and Downstream Dam Face

Photo showing typical Tongue River State Park camping area

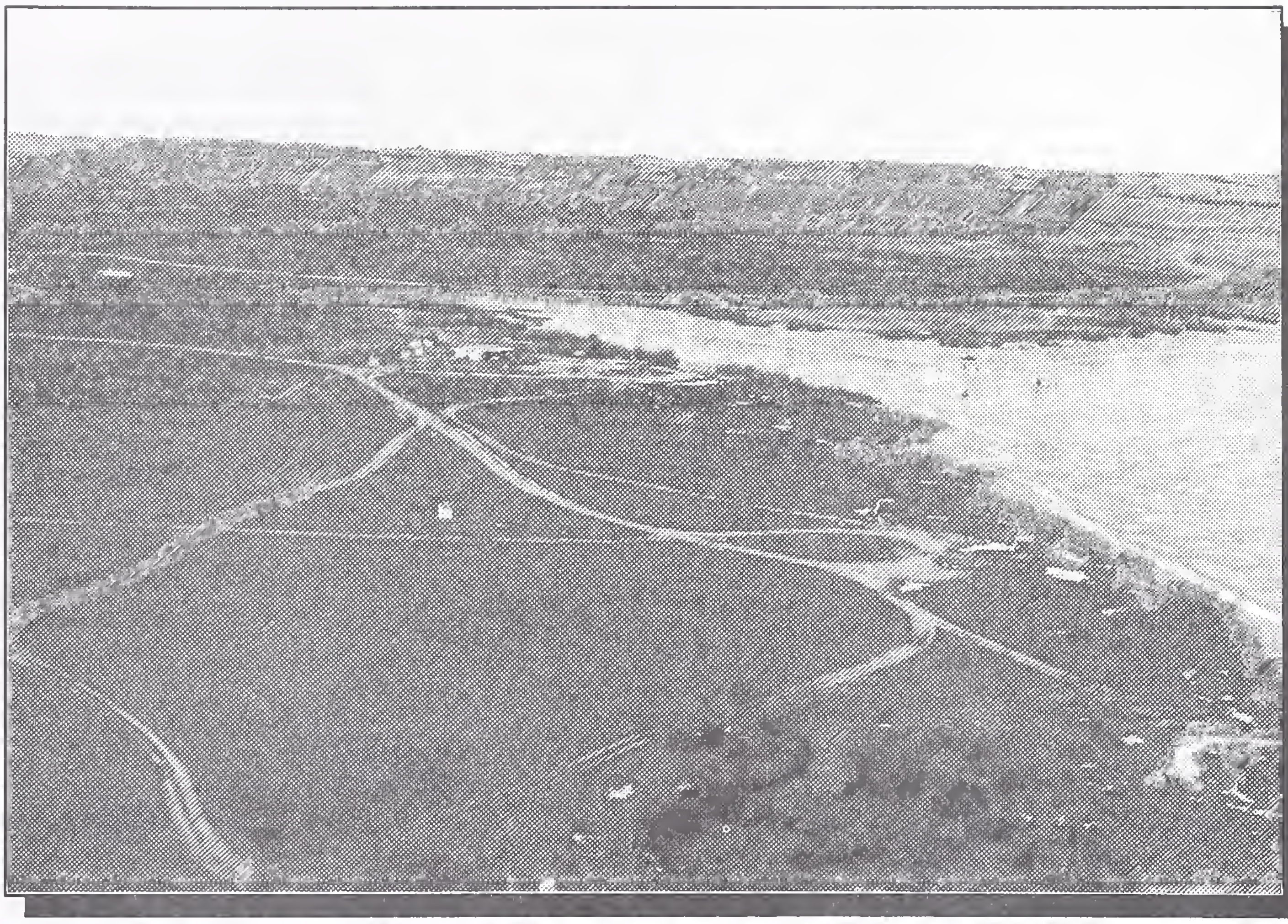


Photo showing the Pike Pond

Figure 3-15. Photographs of Tongue River State Park camp area & Pike Pond area

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter contains the analysis of impacts to the human environment that would result from rehabilitation of the Tongue River Dam and related water rights settlement. Impacts of the fulfillment of Settlement Act water rights, Yellowstone River Water Compact, and fish and wildlife habitat enhancement are discussed in a separate and final section of this chapter since their timing, extent, and nature are unknown at present. This chapter also contains the analysis of cumulative impacts that would result from adding the proposed project alternatives to other existing and reasonably foreseeable activities in the Tongue River Basin and near Sheridan, Wyoming.

To perform the impact analysis contained in this chapter, certain assumptions were made, and reasonably foreseeable activities described. These are for the purpose of this analysis only. They are not intended to be the final projection of future activities that may or may not materialize in the area over the next 5 years. Where no impacts exist under a specific heading (e.g., cumulative effects), no discussion is provided. The project sponsors' mitigation for the impacts in this chapter are detailed in **Chapter 2, Section 2.3.9**, unless otherwise specified.

4.1.1 Assumptions

- Project-related road construction would be initiated in late summer to early fall 1996. Spillway construction would begin in spring 1997.
- Reclamation would be initiated when an area was no longer needed for project activities.
- Local short-term impacts of the project are those that would occur from preconstruction through reclamation and mitigation; until about the year 2000. Long-term impacts of the project are those that would persist beyond completion of the project. For construction and operation activities considered in the cumulative analysis, short-term impacts are those that occur during the term of the respective activities. Long-term impacts are those that would persist beyond the terms of these activities.
- An irreversible and irretrievable commitment of resources would occur when resources were either consumed, committed, or lost as a result of the project. The commitment of a resource would be *irreversible* if the project started a "process" (chemical, biological, and/or physical) that could not be stopped. As a result, the resource, or its productivity, and/or its utility would be consumed, committed, or lost forever.
- Commitment of a resource would be considered *irretrievable* when the project directly eliminated the resource, its productivity, and/or its utility for the life of the project.
- Qualitative terms are used to describe anticipated magnitude of impacts and, where appropriate, anticipated importance of impacts to the human environment. The terms "major," "moderate," "minor," and "negligible" describe magnitude. "Significant," "potential to become significant," and "insignificant" describe importance. Impacts are assumed to be insignificant unless identified otherwise.
- Cumulative impacts are defined as collective impacts of the project when considered in conjunction with other past, present, and reasonably foreseeable activities. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.
- The geographical limits for the analysis of probable impacts in this EIS primarily encompass the reservoir and adjacent shoreline and Tongue River to about 0.5 mile downstream. Where a study area was broader for a particular resource, it is described below.

Hydrology

Tongue River Basin, including the Tongue River and its tributaries from the Montana-Wyoming border to Miles City, is the study area for hydrology.

Aquatics/Fisheries

Tongue River Reservoir and Tongue River from the reservoir to Miles City is the river reach that would be monitored for fisheries mitigation, with focus on the reservoir and river to Four Mile Creek.

Biological Diversity

The study area for biological diversity is the Tongue River Basin.

Socioeconomics

For social conditions, the study area includes the Northern Cheyenne Reservation and the communities of Ashland and Birney, Montana. For economic conditions, the study area includes the Tongue River Basin: Rosebud, Big Horn, Powder River, and Custer counties in Montana and Sheridan County, Wyoming.

Transportation

The study area for transportation is shown on **Figure 3-7**. It primarily includes all or portions of Interstate 90, Secondary Highways 314, 212, and 338, County Road No. 380, and East Shore Road. It also includes a possible rail load-out site and haul route in Sheridan, Wyoming.

Noise

The study area for noise is similar to that for transportation but also includes the reservoir areas that would be affected by construction activities and the town of Decker, Montana.

4.2 CLIMATE

4.2.1 Effects Common to the Construction Alternatives

No measurable effect on the climate of the area would occur for either of the construction alternatives. The microclimate immediately adjacent to the reservoir could be affected due to the increased surface area (during typical years) of the reservoir. This effect would be noticed by a minor moderation in temperature extremes around the reservoir. Impacts on the climate of the area from the construction alternatives would be negligible in the short and long terms.

4.2.2 Effects From Alternative 3

Under Alternative 3, there would be no measurable effect on climate. Impacts on the climate of the area from the no-action alternative would be negligible in the short and long terms. In the event of dam failure, minor changes in the local microclimate could occur; greater fluctuations in temperature would be possible.

4.3 AIR QUALITY

4.3.1 Effects Common to the Construction Alternatives

Air quality impacts from the construction alternatives would include increased pollutants from construction and materials hauling, and from wind erosion of exposed mud flats. Air quality impacts would be minor and would be limited to the period of construction and reclamation.

Construction activities that would impact air quality include road construction, concrete batching, aggregate excavation and processing, site preparation for riprap, heavy construction equipment traffic and exhaust, and travel on unpaved roads. Construction activities would result in particulate and gaseous air pollutant emissions. Airborne particulates from road construction and improvements and resulting traffic on unpaved roads would be mitigated by using water trucks and/or calcium chloride, and periodic grading. Concrete batching and aggregate processing would be mitigated by water spray or other appropriate control measures. Dust from aggregate excavation and hauling would be controlled by watering. Exposed areas from the aggregate excavation and other disturbed areas would be reclaimed to

minimize emissions of particulates. Gaseous emissions would result primarily from diesel and gasoline exhaust. These emissions include oxides of nitrogen, sulfur dioxide, carbon monoxide, and volatile organic compounds.

Construction work on the dam would result in a temporary exposure of beach or mud flat areas due to drawdown of the reservoir. Once exposed to the sun and wind, these areas could erode. Under high wind speeds, exposed mud flats can produce airborne particulates. However, once wind speeds subsided or precipitation occurred, particulate emissions would lessen and/or cease. Once the reservoir were filled seasonal fluctuations in water levels would be more moderate than at present.

Once the reservoir were filled, the new elevation would flood some additional agricultural areas at the upper end of the reservoir. This could result in land exposure to wind erosion during periods of reservoir drawdown.

Construction activities and wind erosion would have a minor localized effect on area air quality. Within the immediate area of the construction work and heavy equipment traffic (including Tongue River State Park), elevated particulate and gaseous pollutant concentrations would occur. Particulate emissions generally are composed of large particulates that quickly settle out to the ground. Remaining fine particulates and gaseous pollutants would be transported downwind. As these pollutants traveled downwind, they would become dispersed and eventually removed through gravitational settling or rain washout. These effects could be minimized by the use of appropriate emission control measures and reducing the time period that disturbed or beach areas were exposed to wind and sun. There would be no measurable effect on the air quality of the Northern Cheyenne Reservation Class I area or the general ambient air quality of the area.

Air quality impacts could occur in the vicinity of the rail load-out facility and within a four-block residential area in Sheridan, Wyoming in the event that the Sheridan load-out were used for the transport of construction materials. The project sponsors intend to use the load-out at Sheridan only if transport of construction materials cannot be successfully negotiated at the Decker coal mines. If the Sheridan load-out were used, dust abatement efforts would be undertaken to avoid air quality impacts in Sheridan. Part of this mitigation effort would include the evaluation of air quality baseline data as a continuous means of gauging and evaluating the effectiveness of dust-control measures.

Indirect effects to air quality could result from increased recreationists' vehicle emissions if the area became more attractive to recreationists. Impacts on air quality from construction alternatives would be negligible to minor in the short term and negligible in the long term.

4.3.2 Effects From Alternative 3

Under the no-action alternative, there would be no change in air pollutant concentrations or emissions. Impacts on air quality from the no-action alternative would be negligible in the short and long terms. However, a potential impact to air quality would occur should the dam fail. The failure could result in increased exposure of beach area and shorelines, which, when exposed to the sun and wind, could erode. In this case, impacts to local air quality could be minor to moderate. No measurable effect would occur at the Northern Cheyenne Reservation Class I area because of the prevailing wind direction.

4.3.3 Cumulative Effects

Cumulative air quality impacts could result from construction and operation of the Tongue River Railroad and possible activities at Decker coal mines. Should construction and reclamation work on the dam coincide with construction work on the proposed Tongue River Railroad, there would be a combined increase in air pollutant concentrations from particulates and gaseous pollutants.

Pollutant emissions from Decker coal mines include particulates, oxides of nitrogen, sulfur dioxide, carbon monoxide, and volatile organic compounds. However, the cumulative effects of these pollutants

would not exceed Montana or federal air quality standards and would be limited to the proposed 2-year dam construction and reclamation period; afterwards localized air quality impacts would be reduced considerably.

The cumulative impacts on air quality from construction alternatives and coal mine emissions would be negligible to minor in the short term and negligible in the long term.

4.4 GEOLOGY

4.4.1 Effects Common to the Construction Alternatives

4.4.1.1 Geologic Stability

Increased water levels as a result of increasing the height of the spillway crest would have the potential to reduce slope stability at various locations around the reservoir. There are existing slope failures and rock slides in parts of sections 13, 24, and 25, T8S, R40E. As water saturates soils at the base of slopes, it tends to make them more fluid, less cohesive, and less able to support overlying materials. Potential slope failure could effect reservoir capacity and dam integrity (due to overtopping by a large wave created by a slide falling directly into the reservoir). Also, risk to human health and safety would exist if people were using or near a slide-prone area when failure occurred.

Slope failures and rock slides have a low probability of occurrence and depend on the characteristics of the overburden as well as the saturation process. There are no data supporting or refuting the conclusion that increased water levels in the reservoir would impact geologic stability. The slide area in Section 13 would be monitored in accordance with the Monitoring Plan (**see Chapter 2, *Proposed Mitigation and Monitoring***).

Impacts to geologic stability (slope failures and rock slides) following increases in reservoir water levels would be negligible to minor over the short and long terms.

4.4.2 Effects From Alternative 3

Under the no-action alternative, water levels would remain as they have been historically and the impacts on geologic stability would be negligible.

4.5 GEOTECHNICAL STABILITY

4.5.1 Effects Common to the Construction Alternatives

Geotechnical stability of dam embankments is generally measured by factors of safety. A factor of safety in excess of minimum standards is presumed to be safe.

Both construction alternatives would have equal stability ratings and would exceed commonly accepted design criteria stability safety factors (**see Table 4-1**). Impacts on geotechnical stability from construction alternatives would be negligible in the short and long terms.

4.5.2 Effects From Alternative 3

The no-action alternative would maintain existing levels of geotechnical stability and the impacts would be negligible in the short and long terms.

TABLE 4-1: Factors of Safety for the Existing and Proposed Dam Embankment

Loading Condition	Existing Factor of Safety	Factor of Safety with 4-foot Increase	Minimum Acceptable Factor of Safety
Steady-state seepage downstream face	2.1	2.1	1.5
Steady-state seepage upstream face	2.8	2.8	1.5
Seismic with 0.02g acceleration	2.0	2.0	1.1
Rapid drawdown	2.2	2.2	1.3

Source: DNRC 1994.

4.6
SOILS

4.6.1 Effects Common to the Construction Alternatives

4.6.1.1 Shoreline

Increased water levels would expand the reservoir shoreline. The higher water levels would expose new areas to saturation and wave action. Erosion would occur in these areas until the shoreline reaches a stable beach slope. Erosion is expected to occur for several years after water levels increase and gradually decrease over the long term. The extent of shoreline erosion is dependent on the topography and composition of shoreline materials. Increased boat traffic in the future would increase the rate of erosion in some areas. Soil properties that affect the stability of the shoreline when exposed to reservoir water and wave action include: slope, soil texture, resistance to sloughing, size and angularity of rock clasts and depth to bedrock. Rock outcrops along the lake consist mostly of interbedded light-gray sandy shale and sandstone with baked clinker beds that resulted from burning coal. Clinker scoria is in many areas very competent and resistant to erosion.

Many areas of the shoreline are composed of highly weathered rock which is susceptible to wave erosion and local slope failure. Shale has weathered locally to clay and sandstones to a sandy soil. Clinker deposits in many areas are weathered and broken, consisting of weak sandy silt interstitial material within angular silicified clasts.

DNRC personnel field inspected the reservoir shoreline in January 1996. Judgements on potential shoreline erosion were made by comparing physical properties of existing eroded shoreline with areas to be impacted by the future reservoir level. Shoreline embankments were considered to be impacted up to elevation 3,431.4 feet, the proposed spillway crest elevation plus three feet of wave action freeboard. Based on the shoreline topography and composition of shoreline materials, six erosion units were identified:

Unit 1

Erosion potential low to none. Competent sandstones, shales, and scoria. Local minor erosion of shallow surficial soils would occur.

Unit 2

Erosion potential low to moderate. Fine grained silt-loam soils on gentle slope. Erosion potential is generally low to moderate due to the gentle slope of the shoreline. Minor channels may erode below the full pool shoreline as the water level fluctuates.

Unit 3

Erosion potential low to moderate. Sandy silt soils containing angular cobbles and boulders; or, silty sand and gravel alluvial soils. Soils on moderate to gentle slopes over shallow bedrock. Erosion would decrease as gravels, cobbles and boulders erode to the surface.

Unit 4

Erosion potential moderate to high depending on slope. Thick silt-loam soil on moderate to steep embankment. Shoreline would recede as material is eroded.

Unit 5

Erosion potential moderate to high. Soils consist of silty sands with angular gravels and cobbles. Vertical embankments 2-8 feet high at shoreline would recede 10-20 feet.

Unit 6

High erosion potential. Brecciated and broken siltstone, sandstone and clinker with incompetent interstitial silt and sand. Interbeds of sandstone and shale weathered to silty sands and clays. Vertical shoreline embankments 5-25 feet high. Wave action would undermine incompetent layers causing the embankment slope to fail. Shoreline is expected to recede horizontally up to 30 feet from present location.

The erosion unit locations are identified on **Figure 4-1**. Potentially significant erosion could occur in units 4-6, totalling approximately 7 miles of shoreline. The totals of the different erosion units lengths at the future reservoir elevation are as follows:

Erosion Unit	Total Length (*miles*)
1	4.4
2	12.0
3	14.9
4	0.6
5	3.7
6	2.8

Approximately 2.1 miles of protective riprap exists, and approximately 3.5 additional miles have been proposed along road and railway embankments at the south end of the reservoir. Existing and proposed protective riprap locations are shown on **Figure 4-1**. Where related to other project components (eg. mitigation and enhancement activities), vegetative cover and other means of shoreline stabilization would be considered.

4.6.1.2 Prime and Unique Agricultural Land

No "prime farmland" or "unique" soils have been identified in areas proposed for project construction activities or in areas impacted by the completed project. Approximately 41 acres of irrigated land, designated as "prime if irrigated," would be impacted by increased reservoir water levels. This is less than 5 percent of the soils between the reservoir and the state line that could be designated "prime if irrigated". Impacts to "prime if irrigated" farmland from project activities would be minor in the short and long terms.

4.6.1.3 Soil Productivity in Areas of Project-Related Surface Disturbance

Surface disturbances related to proposed project construction and associated activities (e.g. aggregate mining) have the potential to change the productivity of disturbed soils on up to 167 acres. As a result of stripping and stockpiling, soil structure and horizonation would be altered. Soil compaction may result from material laydown, temporary facility construction, and vehicle operation. Soil loss from wind and water erosion may occur on unprotected areas.

Construction and reclamation plans include methods to minimize the negative impacts to soil productivity. The final reclamation plan would include soil salvage and redistribution methods. These methods would maintain soil structure and minimize the mixing of surface and subsurface soil horizons. Surface horizon organic matter and essential nutrient concentrations would be maintained as much as possible. Soil compaction should be alleviated by tillage. While soil microorganism populations, fertility, and viable plant reproductive structures (e.g., seeds, shoots, bulbs) would be reduced by topsoil stockpiling, they would rejuvenate within a few years with proper reseeding and mulching. The soil erosion hazard after reclamation may be reduced by maintenance that includes mulching, access control, appropriate application of soil replacement, seedbed preparation, and general reclamation techniques. These measures would be approved by DEQ under a stormwater control permit. Impacts to soil productivity in areas of project-related surface disturbance would be moderate to major over the short term and minor over the long term.

4.6.1.4 Relocation of State Park

Surface disturbances related to the relocation of the State Park facilities (see Recreation) would change the productivity of the soils due to compaction and location of various facilities. The relocation of access roads, recreation sites, and concession-related facilities would commit this land and underlying soils to designated recreational use. Impacts from relocation of State Park facilities on soil productivity and commitment of soil resources to permanent recreational use would be minor in the short and long terms. For further discussion of impacts on soils, see **Sections 4.24 and 4.26**.

4.6.2 Effects From Alternative 3

Under the no-action alternative, shoreline erosion will continue at existing rates. No additional land would be inundated. Soil productiveness would remain at current levels. No "prime if irrigated" farmland would be affected and no soil resources would be irreversibly committed to other uses. The impacts to soils associated with the no-action alternative would be negligible. However, under dam failure, impacts to soils and soil productivity from erosion and deposition would be major and significant.

SHORELINE EROSION POTENTIAL

Figure 4-1. Shoreline Erosion Potential

4.7
HYDROLOGY

4.7.1 Effects Common to the Construction Alternatives

4.7.1.1 Reservoir Operations

Both construction alternatives would produce a 4-foot increase in spillway crest elevation, allowing the maximum controlled reservoir storage to increase from about 67,000 af to about 80,000 af. The reservoir surface area and storage capacity are shown on **Table 4-2** and **figures 4-2 to 4-4.** Increased reservoir storage combined with a fully operational spillway would produce changes in reservoir operations when compared to historic operation. Operation of the reservoir would be similar for both construction alternatives. In general, the reservoir would be operated within an established reservoir operations plan with first priority given to meeting up to 60,000 afy of demands (**see Table 4-3**). If these demands were not called for, any remaining portion would be left in the reservoir.

TABLE 4-2: Elevation vs. Surface Area and Storage Capacity

Elevation *feet*	Surface Area *acres*	Storage Capacity *acre-feet*
3,354.4	0	0
3,374.4	217	1,473
3,380.0	375	3,123
3,390.0	683	8,488
3,400.0	1,136	17,645
3,405.8	1,380	25,373
3,410.0	1,639	31,613
3,415.0	2,189	41,183
3,420.0	2,754	53,541
3,424.4	3,198	66,638
3,428.4	3,612	80,254
3,442.2	4,740	130,000

Source: GeoResearch, Inc. 1991.

Reservoir capacity is decreasing due to natural sedimentation. The project will have little effect on the rate of sedimentation. DNRC is conducting a sedimentation study to determine present volume of the reservoir. Using information from the new study will allow the rate of sedimentation to be projected. Losses of storage in the reservoir due to sedimentation will be shared proportionally among all water contract holders and the Tribe as specified in the Compact.

A construction-related interim reservoir operations plan has been developed by, and is on file at, DNRC. A five-member advisory committee would be established following construction of the project to develop the final reservoir operations plan. The members would include representatives from the Northern Cheyenne Tribe, the State of Montana, the Tongue River Water Users Association, the United States, and a fifth member to be selected by the other four.

Key components of the construction-related interim reservoir operations plan include:

- a maintenance program to clear critical areas of the reservoir, dam, and spillway of floating debris;
- as much as practical, maintaining the reservoir elevation and downstream releases during winter months at consistent levels. This would allow for flood storage during high runoff events, minimize ice jams and pressures associated with higher reservoir elevations, minimize impacts on the reservoir and downstream fisheries, and minimize exposure of the mud flats at the south end of the reservoir; and
- goals aimed at satisfying existing contract water rights and the Northern Cheyenne Water Rights Compact. Recreation and other secondary goals would be satisfied depending on the availability of water.

TABLE 4-3: Water Rights and Contracts in Tongue River Reservoir

Water User	Amount *acre-feet per year*
Tongue River Water Users Association (contract water)	32,500
Northern Cheyenne Tribe (existing contract water)	7,500
Northern Cheyenne Tribe (new compact water)	up to 20,000[1]
TOTAL	**up to 60,000[1]**

Source: GeoResearch 1991; DNRC 1981.
[1] Inclusive of the 5,000 afy Tribal credit for agricultural return flows

Initially, with the 4-foot raise in the spillway crest elevation, Tongue River Reservoir elevations and contents generally would be higher than those that have occurred historically. However, seasonal reservoir fluctuations would occur as water was stored in the spring and released in the summer for downstream consumptive uses. **Figures 4-5 and 4-6** compare reservoir elevations and contents for two hypothetical postconstruction scenarios to those that have occurred historically during a typical (median) year. During drought years, greater reservoir fluctuations would occur than those indicated in **figures 4-4 and 4-5**. In fact, it is foreseeable that even with the increased reservoir storage capacity, the reservoir could still drop to very low levels (dead storage or 1,500 af of capacity) during extreme droughts. Expected reservoir elevations and storage by month, including information regarding elevation fluctuations and figures for wet and drought years, are indicated in **Appendix E**.

Ultimately, reservoir elevations and contents would be determined by: 1) how the reservoir is operated, 2) how much reserved water the Tribe develops for consumptive uses, and 3) how much additional water is developed by Wyoming. Water development by both the Tribe and Wyoming is discussed in greater detail under ***Fulfillment of Settlement Act Water Rights in the Tongue River Basin*** and ***Impacts from the Yellowstone River Compact***.

Median reservoir storage for the existing condition is 29,000 af at elevation 3,407 feet. Median reservoir content for the construction alternatives with no further development of Wyoming water rights would be 69,000 af at elevation 3,425 feet. Median reservoir content for the construction alternatives and full development of Wyoming water rights would be 47,000 af at elevation 3,417 feet.

Future reservoir operations shown on **figures 4-5 and 4-6** and in **Appendix E** demonstrate that both construction alternatives, during typical years, would hold the reservoir at a higher elevation when compared to the existing condition. Direct and indirect impacts to air quality, fisheries, and aquatics in the reservoir, recreation, vegetation, geology, and soils from raised water levels are discussed in the appropriate sections. For further discussion of impacts on hydrology, see Implementation of Fish and Wildlife Habitat Enhancement Features. Impacts on periodic reservoir elevations and median reservoir storage from construction alternatives would be major and significant in the short term and major, beneficial, and significant in the long term.

4.7.1.2 Downstream Releases

During Construction

In general, during construction, downstream releases would be about equal to the inflow to the reservoir due to reduced available storage. Downstream releases would supply water (decreed water rights) to decreed water users that normally would be available without using water stored in the reservoir.

In general, operational constraints during construction would result in downstream releases shown in **Appendix E**. Downstream flows would approximate historic conditions with the exception of temporary reductions related to construction activities, or due to natural-occurring low-inflow periods where releases cannot be made from reservoir storage due to reduced maximum storage levels. Peak downstream releases during the months of heavy runoff would be greater because inflow peaks could not be stored. Typical river depths over riffles downstream during construction are shown on **Figure 4-8.** Short-term impacts to downstream releases during construction would be moderate. See **Chapter 2**, Agricultural Mitigation, for the project sponsors' proposed means of assuring that water reaches the T&Y diversion during construction.

Following Construction

The increase in reservoir storage combined with a fully operational spillway would produce changes in downstream releases under both construction alternatives. Typical streamflows below the dam following construction are shown on **Figure 4-9** and in **Appendix E**. Two scenarios are presented for Wyoming's use of Yellowstone River Compact water. See **Sections 4.24 and 4.25** for further discussions of the Northern Cheyenne -Montana Water Rights Compact and the Yellowstone River Compact.

NOTE

Water level in this photo approximates potential reservoir pool level of 3428.4 taken during flood of May 1978

Photo composited from 5/19/78 flight by Montana Department of Transportation, Photo Services

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APPROXIMATE SCALE IN FEET

Figure 4-2. 1978 Aerial Photograph of Reservoir Near Elevation 3428 Feet

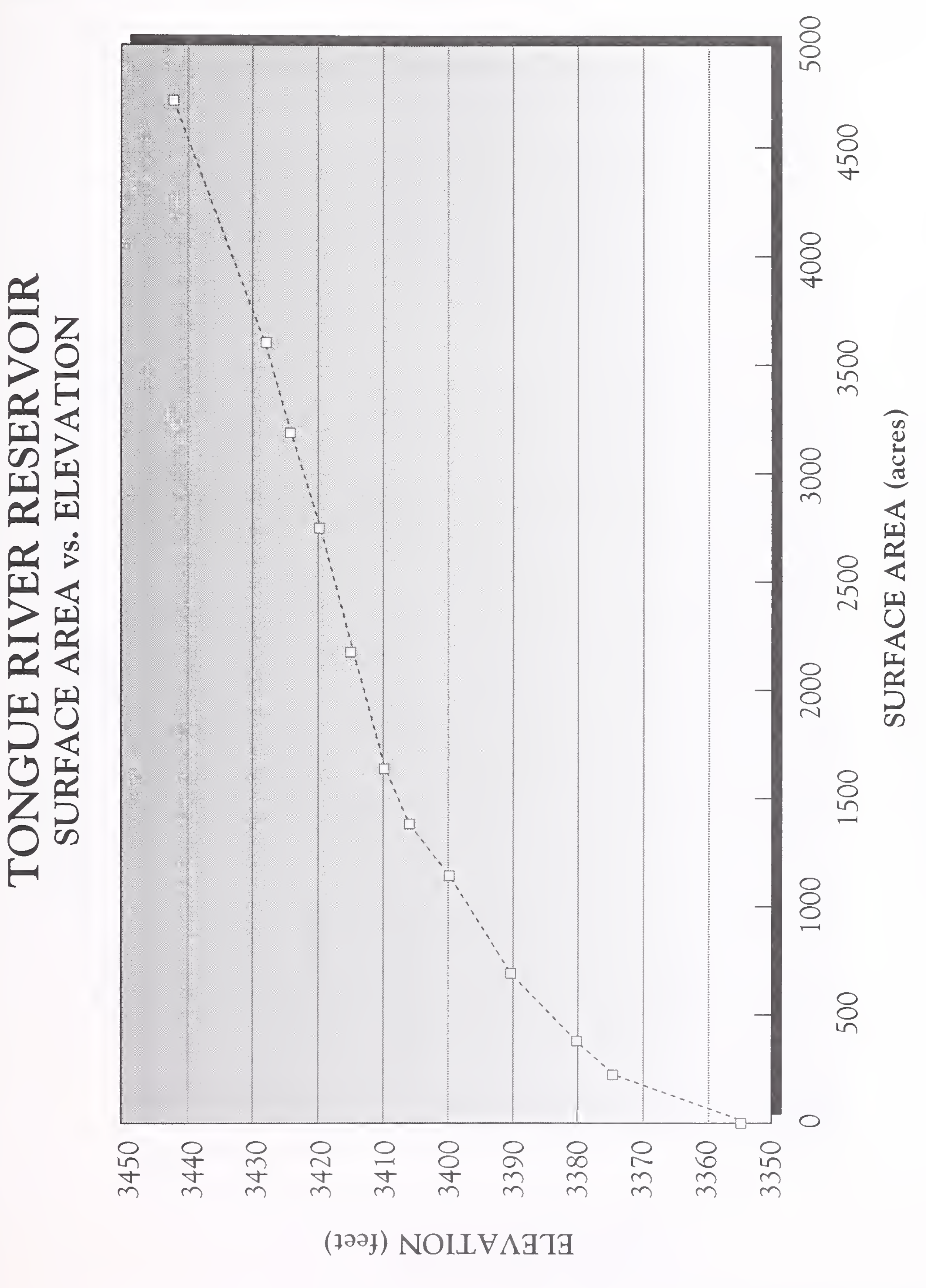

Figure 4-3. Tongue River Reservoir Surface Area vs. Elevation

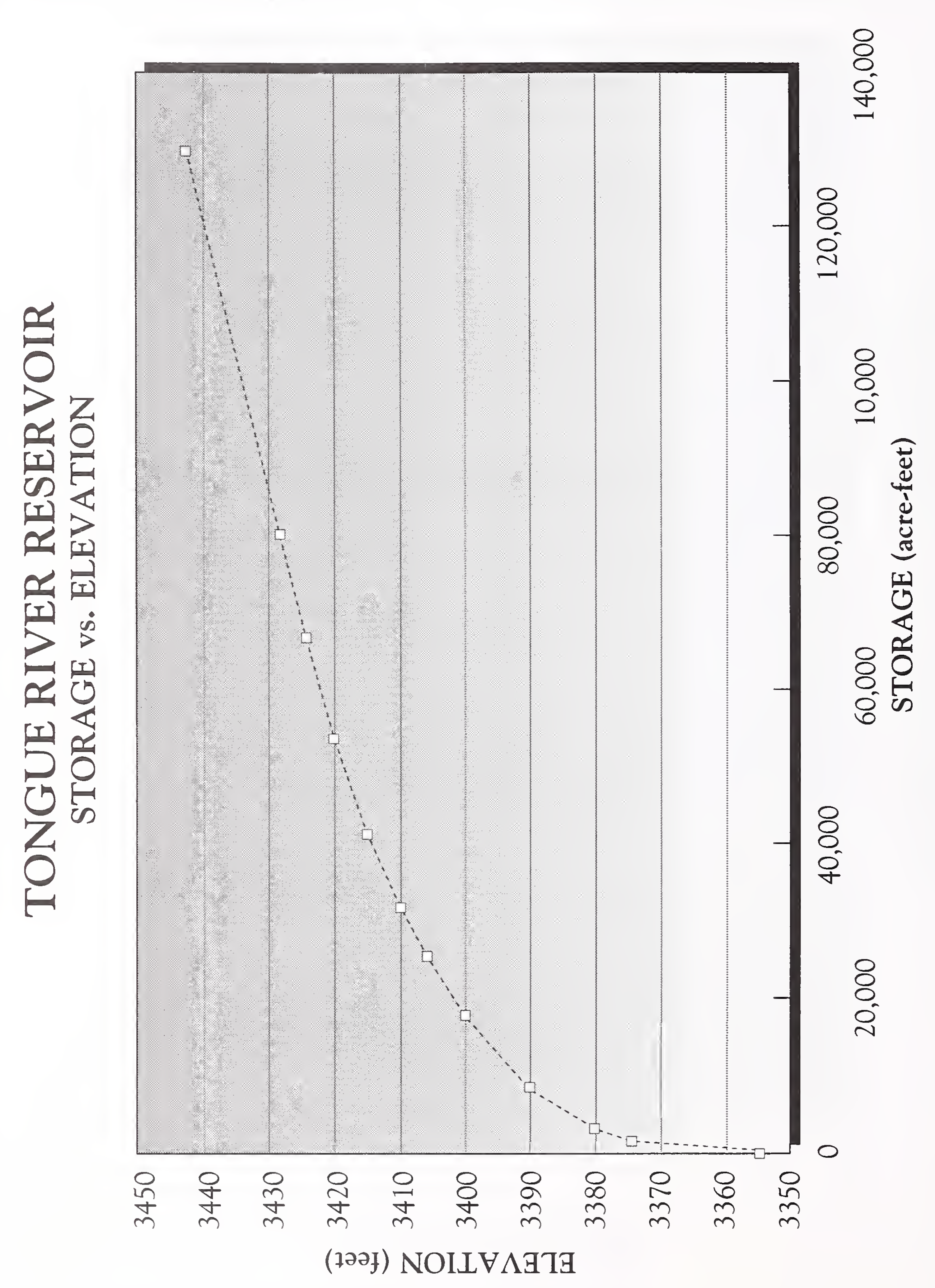

Figure 4-4. Tongue River Reservoir Storage vs. Elevation

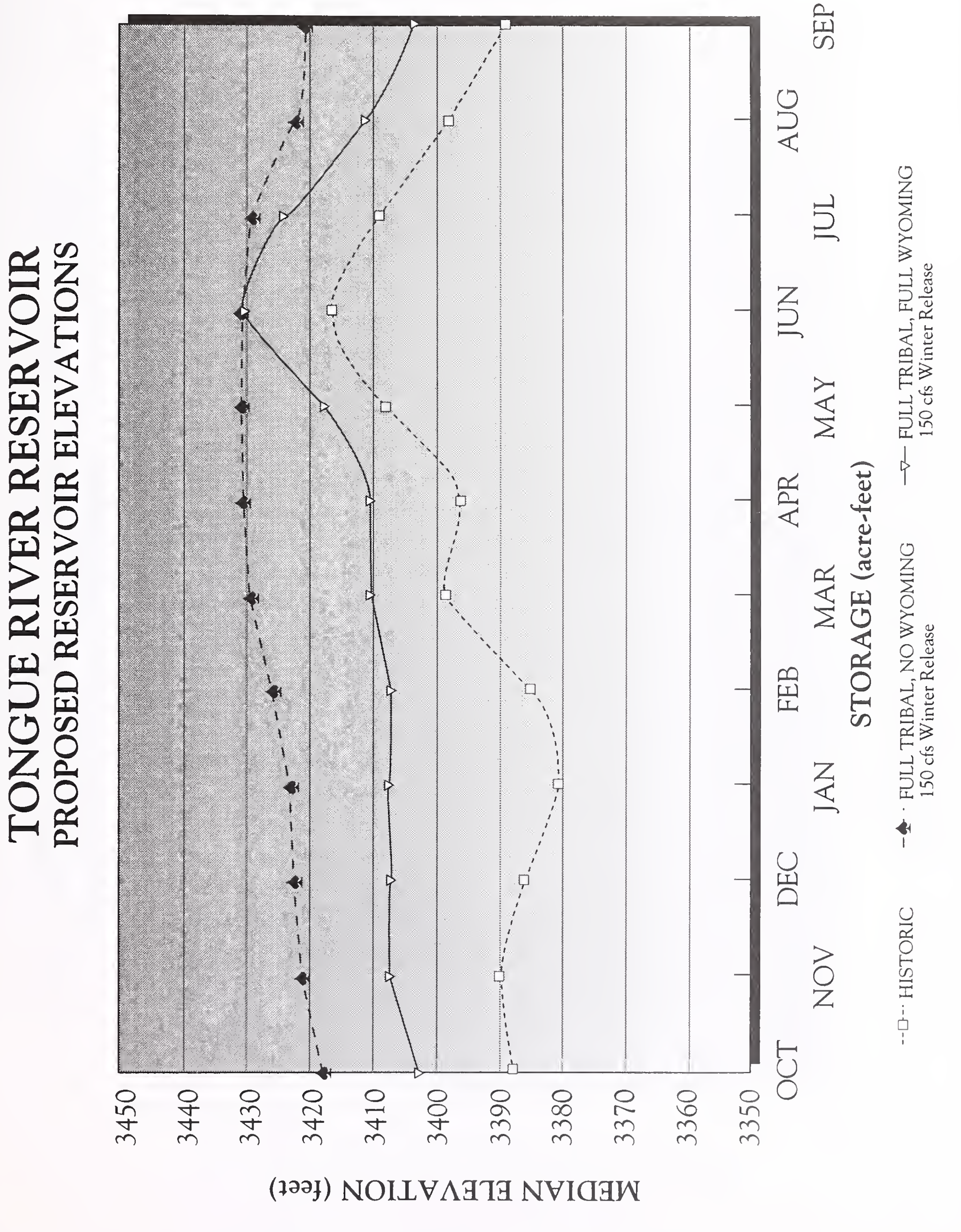

Figure 4-5. Tongue River Reservoir Proposed Reservoir Elevations

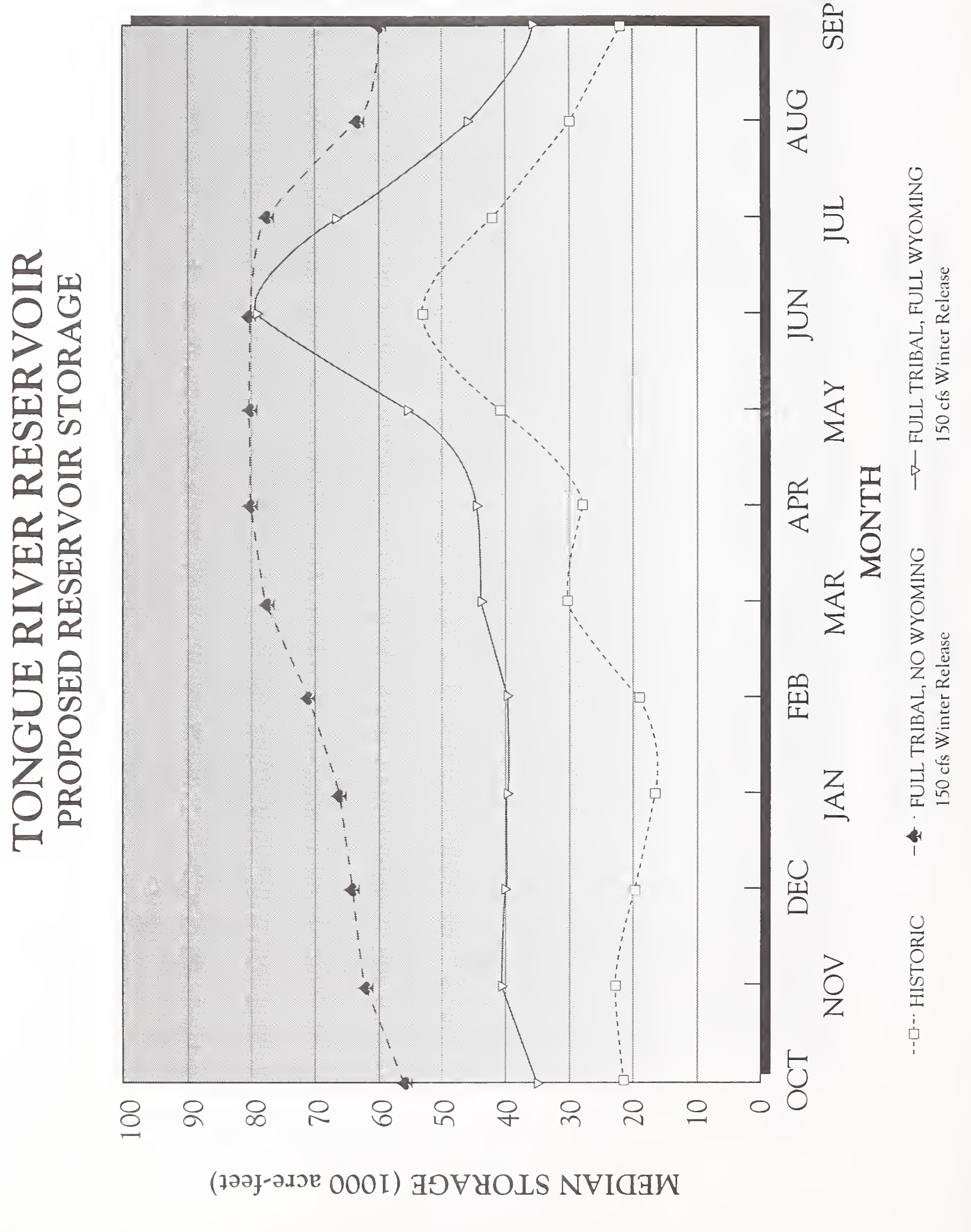

Figure 4-6. Tongue River Reservoir Proposed Reservoir Storage

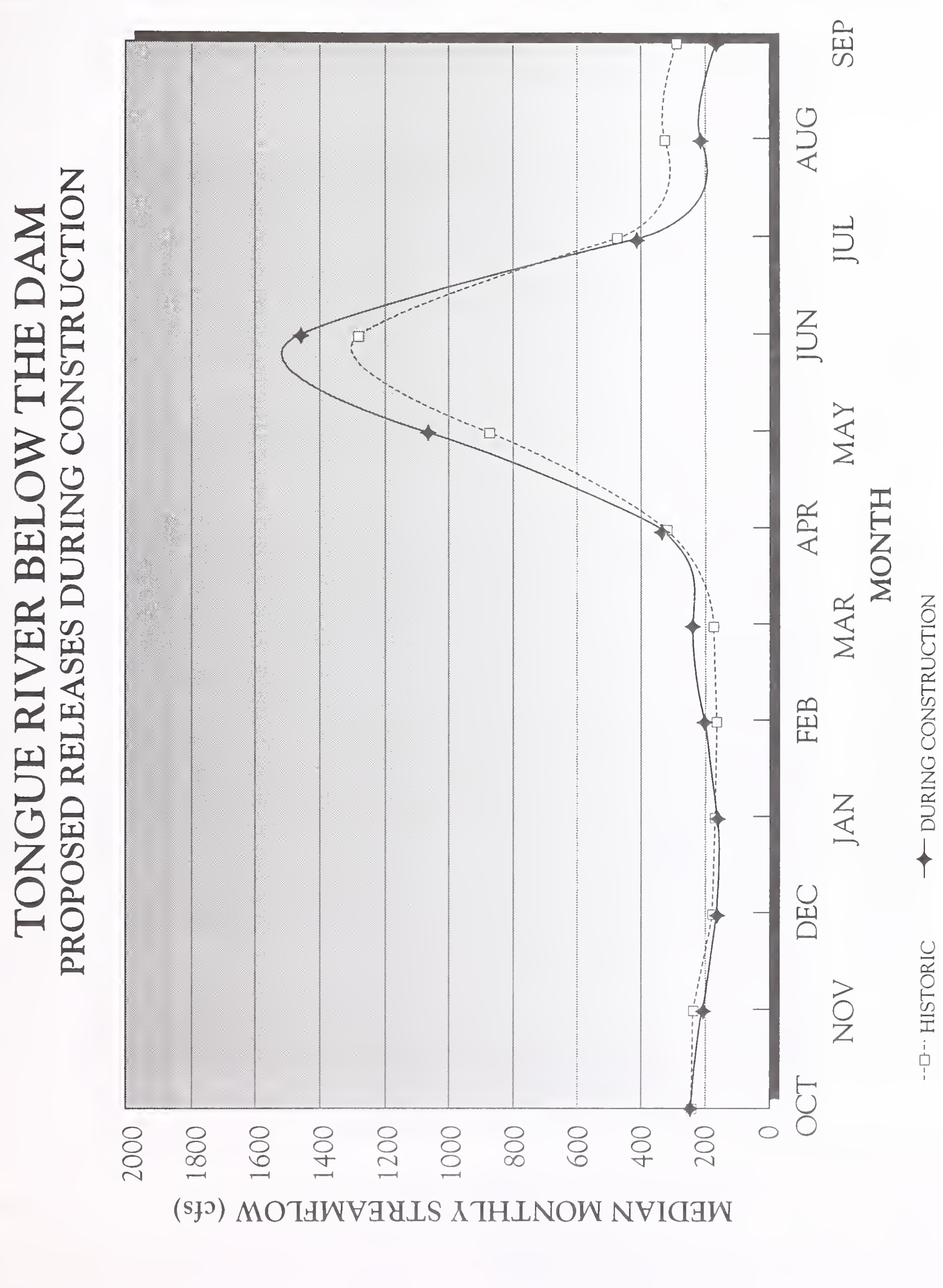

Figure 4-7. Tongue River Below The Dam Proposed Releases During Construction

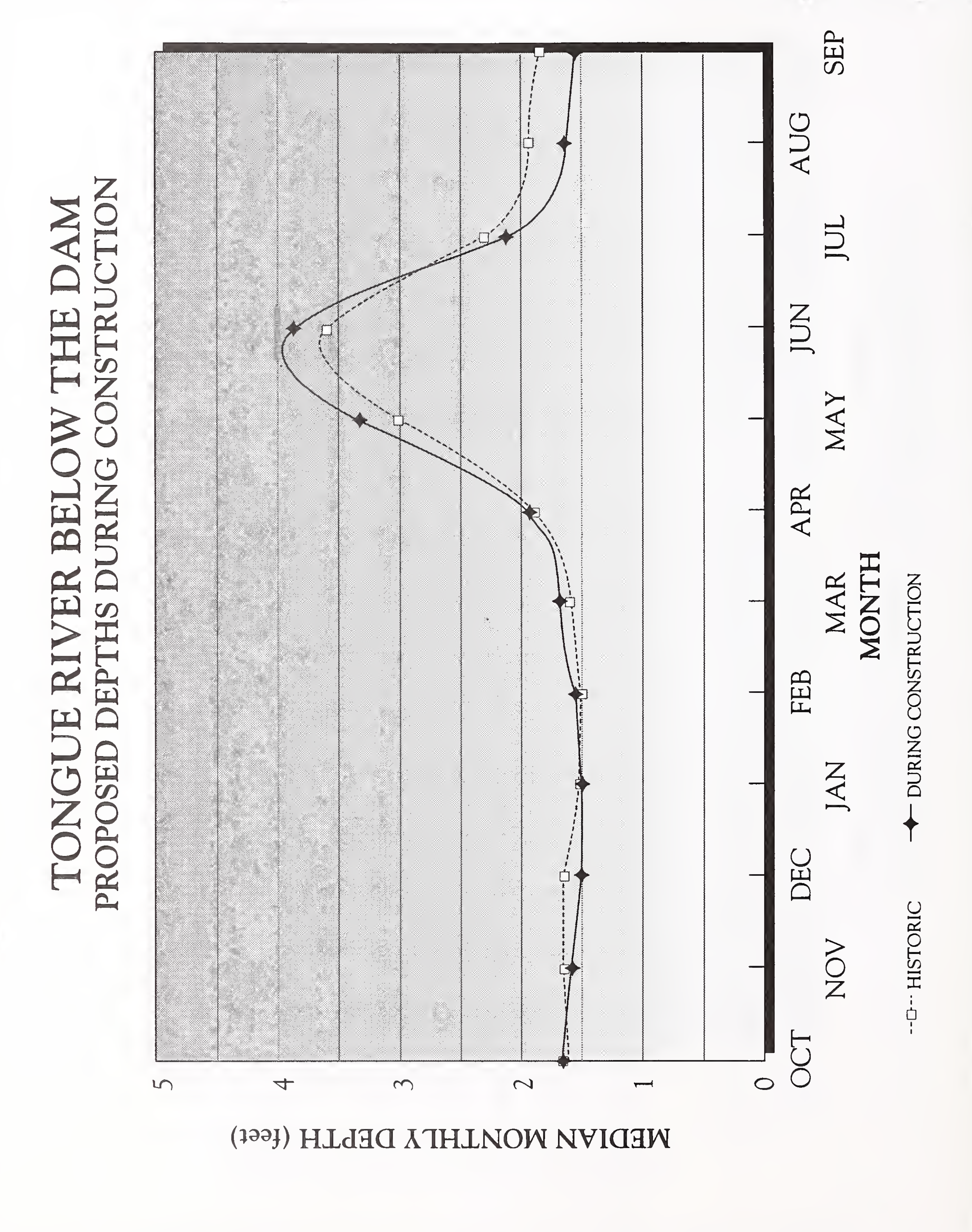

Figure 4-8. Tongue River Below The Dam Proposed Depths During Construction

The first scenario is based on no further development of Wyoming's compact water. The second scenario demonstrates full development of Wyoming's Compact water. Typical river depths over riffles are shown on **Figure 4-10**.

Historical streamflows at Miles City are shown on **Figure 3-2** and in **Appendix E**. Typical streamflows at Miles City following construction are shown on **Figure 4-11** and in **Appendix E**. Two scenarios are presented for Wyoming's use of their Yellowstone River Compact water. Typical river depths over riffles at Miles City are shown on **Figure 4-12** for the two Wyoming Compact water scenarios.

These figures and tables demonstrate that streamflow would be reduced from historic levels during heavy runoff months from mid-March through June due to additional reservoir storage. Rehabilitation of the spillway would allow the reservoir to be filled safely to the spillway crest. Streamflow during late summer and fall could be reduced due to irrigation use and increased water storage prior to the runoff season. Long-term impacts to downstream releases under the construction alternatives would be moderate.

Reservoir Ice

Reservoir water levels would increase under both construction alternatives. Historically, the reservoir has been drawn down by irrigation releases through the summer, and maintained at a low elevation during the winter months (**see Figure 4-5**) to avoid use of the spillway in the spring. The interim operation plan would provide for higher reservoir elevations during the winter months. This would reduce the rise and fall of reservoir ice which has caused problems for ice fisherman. The increased reservoir elevations during the winter could cause some increased scouring of the shoreline by ice action. Impacts of reservoir operations and increased water levels on reservoir ice formation and damage would be minor in the short and long terms.

Upstream River Ice

The increased reservoir water levels during late winter and early spring could increase river ice jamming and flooding of the upper reservoir area. This condition could increase bank erosion and damage woody riparian vegetation from ice scour. Impacts of reservoir operations and increased reservoir water levels on upstream ice jams and related damage and flooding would be minor to moderate in the short term and minor in the long term.

Downstream River Ice

The goal of the postconstruction reservoir operations plan would be to provide consistent river releases from the rehabilitated project during winter months to provide minimum stream flows and prevent the river from freezing from the bed up (formation of anchor ice). Ice jams and flooding would not be increased above current levels by this operation. Impacts of reservoir operations on downstream ice jams and related flooding would be negligible in the short and long terms.

4.7.1.3 Coal Mines

Proposed construction activities require that the reservoir be drawn down over a 2-year period. Decreasing the reservoir water surface elevations during construction would decrease the elevation differences between the reservoir water surface and pit floors and, other determinants remaining the same, decrease seepage inflows into the coal mine pits. These positive impacts to groundwater seepage inflows to the coal mine pits from the decrease in reservoir water levels during construction would be minor to moderate during the construction period.

Under current conditions, groundwater seeps from the reservoir into the open mine pits[1]. Seepage rates are determined by the relative elevations between the reservoir water surface and pit floors, distance from the reservoir to the pits, and geologic stratigraphy along the flow paths between the reservoir and pits.

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[1] Past seepage rates into the pits were estimated by MPDES discharge rates, adjustments to these rates, and rates calculated from the USGS Method. The Decker Coal Mine Mitigation Study (Western Water Consultants, Inc. 1994) presents the method of estimating current rates, of calculating future rates, and discusses technical factors influencing these rates. It is the intention of this EIS to disclose the basis for mine mitigation (pumping), and estimate potential impacts of mitigation activities. Historic seepage into pits includes other sources not related to the reservoir. Therefore, impact assessment will focus on estimates of seepage into mine pits as a result of higher reservoir stages over and above existing seepage.

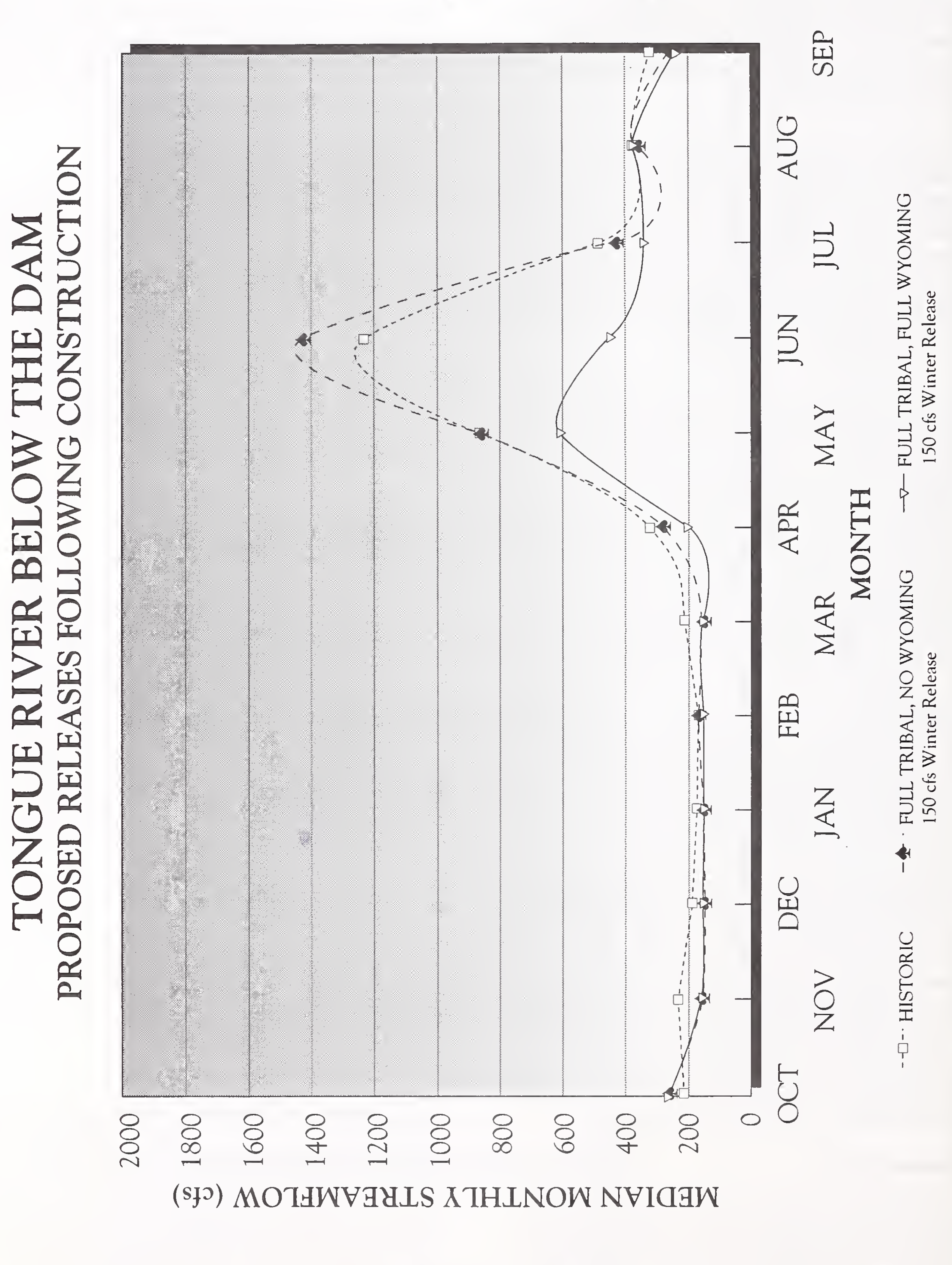


Figure 4-9. Tongue River Below The Dam Proposed Releases Following Construction

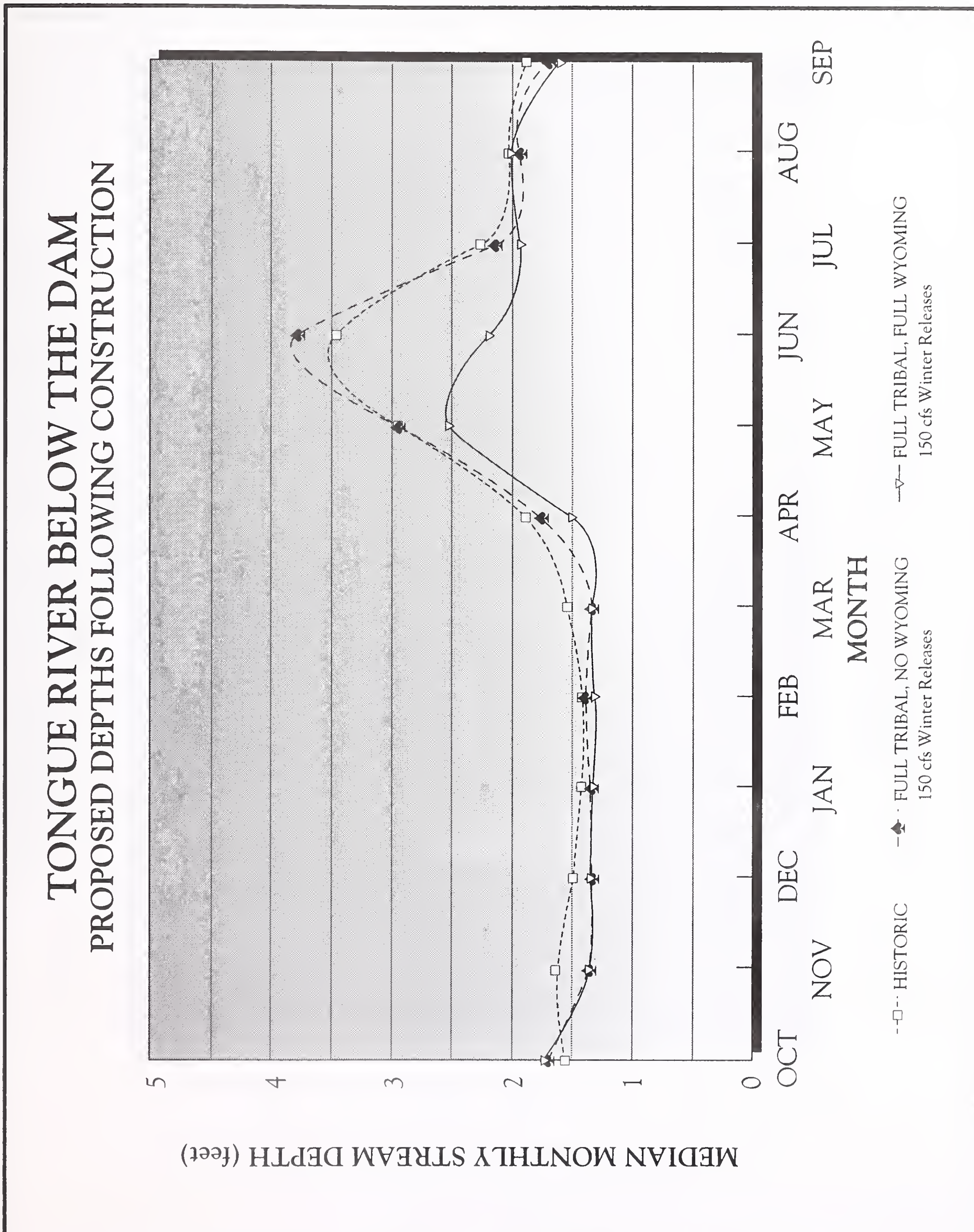


Figure 4-10. Tongue River Below The Dam Proposed Depths Following Construction

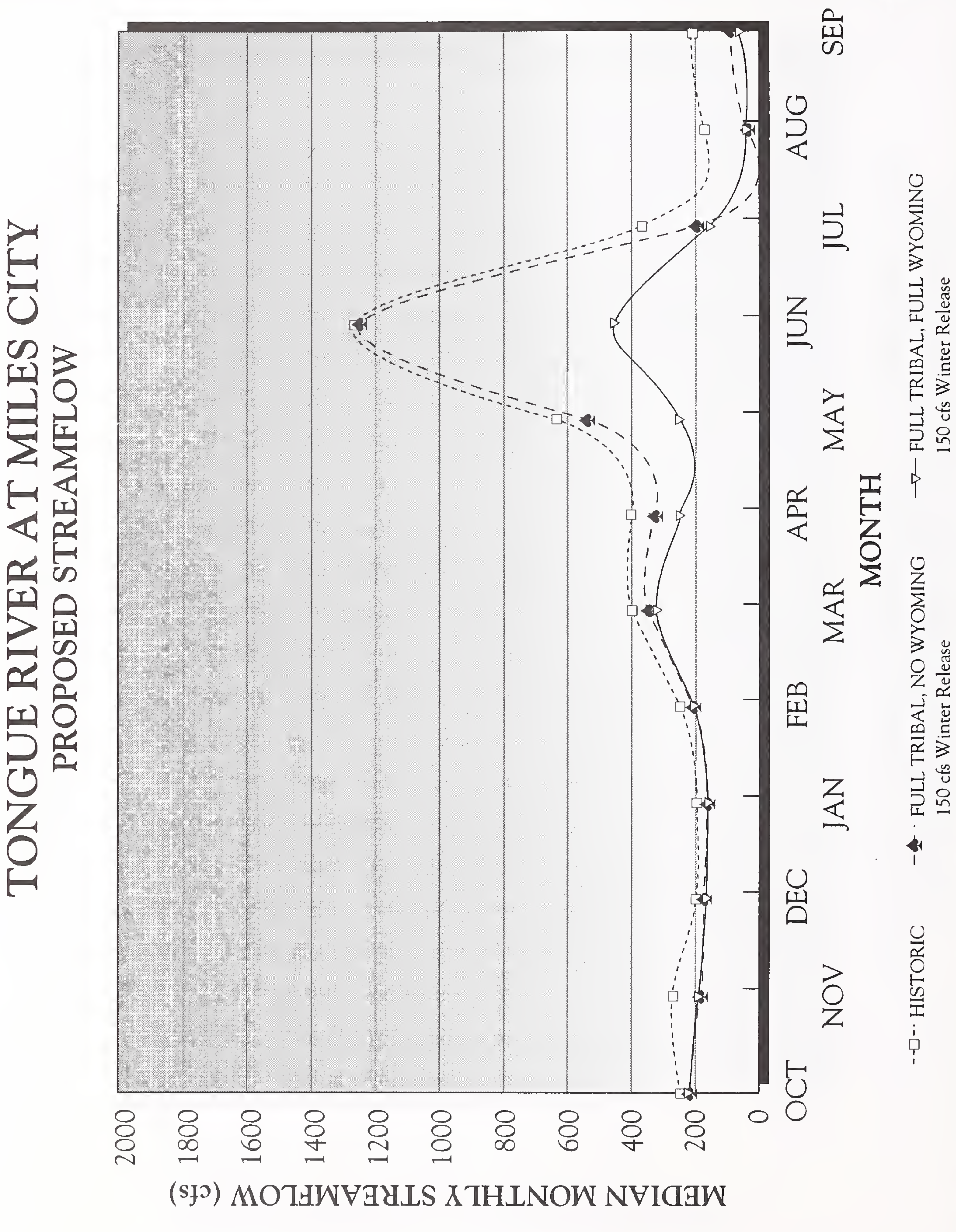


Figure 4-11. Tongue River At Miles City Proposed Streamflow

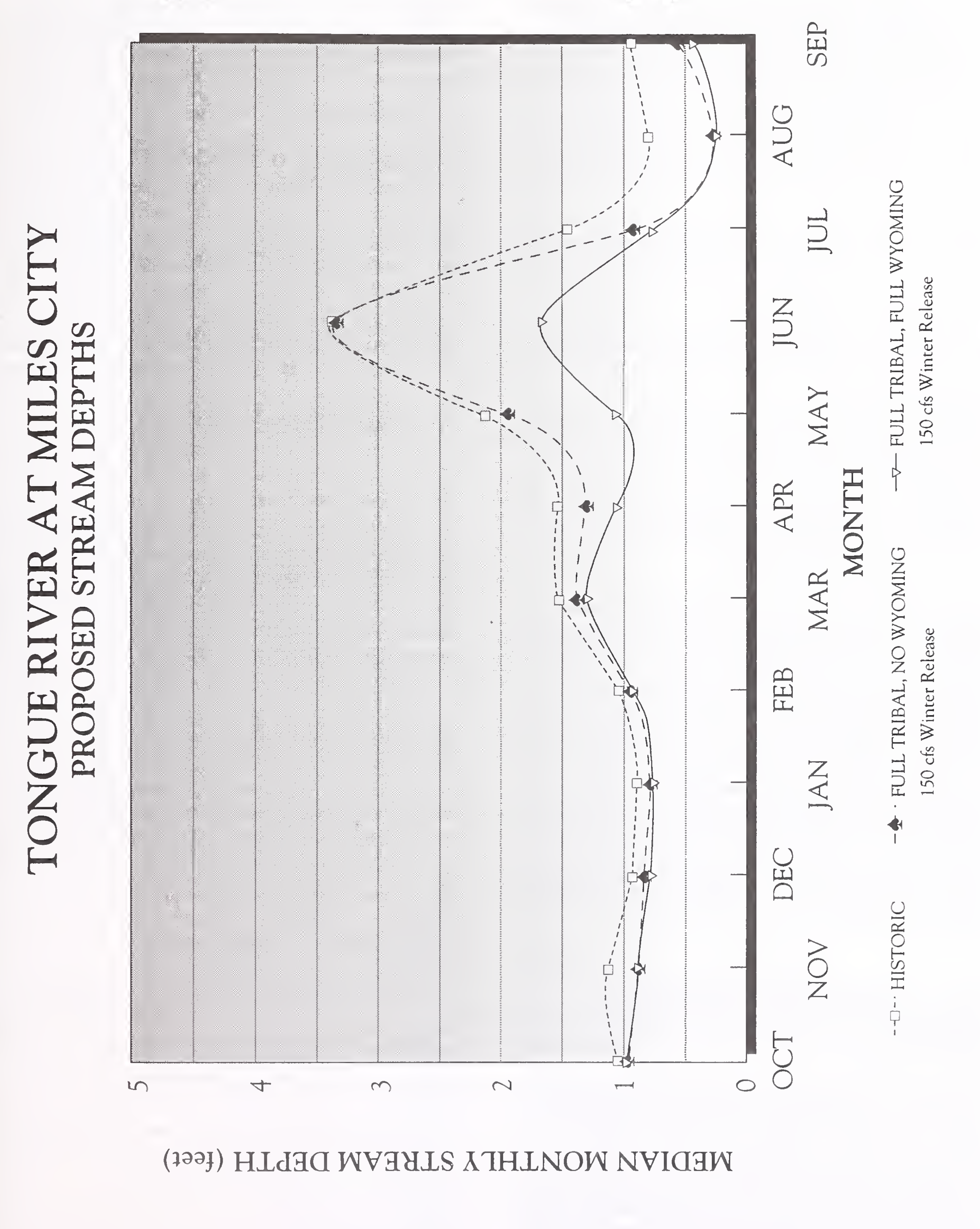


Figure 4-12. Tongue River At Miles City Proposed Stream Depths

As a result of increased reservoir levels, there would be an increase in the groundwater seepage rate into mine pits. Increases to seepage rates are estimated at 200 gallons per minute (gpm) for pits at the south end of the East Decker Mine, up to 540 gpm for the West Decker Mine pits, and between 940 gpm and 3,000 gpm for future pits at the north extension (Western Water Consultants, Inc. 1994).

Impacted facilities at the East Decker Mine could include two existing soil and overburden stockpiles, four monitoring wells, and 11 sections of embankments, one MPDES water quality monitoring station, and one sediment pond. Impacted facilities at the West Decker Mine could include two monitoring wells, and two MPDES water quality monitoring stations. Impacts at the north extension could include four monitoring wells and one MPDES water quality monitoring station. It does not appear that other facilities such as roadway and railroad tracks, culverts and bridges, powerlines, and utilities would be significantly impacted.

The Decker Coal Company Mine Mitigation Study (Western Water Consultants, Inc. 1994) presents the structural, non-structural, operational and maintenance activities that could be employed to mitigate the impacts to the coal mine pits resulting from the increase in reservoir water levels during postconstruction reservoir operation (**see Chapter 2, *Coal Mine Facilities Mitigation***). Long-term impacts of groundwater seepage inflows to the coal mine pits from the increase in postconstruction reservoir water levels would be negligible. Long-term impacts to other local mine facilities from increased reservoir elevations would be negligible.

4.7.1.4 Increased Annual Discharges Associated With Coal Mine Facilities Mitigation

As a result of raising the spillway crest elevation 4 feet and proposed operating procedures, future reservoir levels typically would be higher than historic levels (**see Figure 4-5**). Therefore, groundwater seepage rates into mine pits are expected to increase. This increased seepage would require increased pumping rates to dewater the pits, would increase flows to settling ponds, and increase discharge of pit water at permitted discharge stations. Increased discharge flows have the potential to impact the water quality of Tongue River Reservoir and Tongue River downstream of the reservoir.

The collective increase in discharges from the east, west, and north Decker pits could be as high as 3,740 gpm. The concentration of total dissolved solids (TDS) in the discharge could average 1,825 milligrams per liter (mg/l). The average concentration of TDS in Tongue River Reservoir is 440 mg/l. A conservative estimate of the impact of increased mine pit discharges on the quality of flow into the reservoir can be made by blending the maximum discharges from the mine pits with the average flow at the Tongue River Reservoir of 450 cubic feet per second (cfs) (over 200,000 gpm). TDS concentrations weighted by the discharges from the respective pits are combined with flow and TDS concentration at the reservoir. The blending would result in a flow increase of approximately 1 percent (from 450 to 456 cfs) and an increase in TDS concentration of approximately 4.5 percent (from 440 to 460 mg/l). The resulting estimate of the increase in the TDS concentration in the reservoir, assuming typical streamflows and reservoir mixing, likely would not be detectable. Since downstream discharges occur after the mixing of the increased TDS flows within the reservoir, increases in TDS concentrations resulting from pit dewatering may not be detectable. Impacts of increased mine pit discharges on reservoir and downstream water quality would be negligible in the short and long terms.

4.7.1.5 Shallow Groundwater

Proposed construction activities require that overall reservoir operation be altered from existing conditions in terms of storage and releases. The change in the schedule and magnitude of releases has the potential to impact downstream flows and related groundwater recharge to shallow aquifers. During construction, a target release of run-of-river flows or if possible 190 cfs is planned.

There are reaches of Tongue River downstream from the dam that either gain from and/or lose water to

the adjacent alluvium. There are many hydrologic, climatic, and management factors that determine whether and how much the river gains or loses within a reach. However, groundwater recharge immediately below the dam would be impacted more than reaches further downstream; contributions from side streams would recharge shallow groundwater further downstream. Construction scheduling and mitigation would be implemented in such a way as to minimize the impact of streamflow reductions on shallow groundwater and its users during the 2-year construction/reclamation period. Short-term impacts on shallow groundwater from decreases in streamflows during construction would be negligible to minor.

4.7.1.6 Groundwater

When proposed construction were complete, and during typical years, the reservoir would be operated at higher-than-historic water levels **(see Figure 4-5).** At the proposed spillway elevation, the reservoir surface area would increase by approximately 400 acres. As unsaturated surface soils and subsurface materials were inundated, water would infiltrate and percolate through the materials. The main factors that determine how quickly or slowly water moves into and through soil materials are the depth of overlying water and the characteristics of the materials. The length of time that water covers soil materials is also an important determinant of the amount of water that infiltrates and percolates through the soil. In any case, the rates at which water moves into and through soil materials and to groundwater eventually stabilizes, or reaches equilibrium. Equilibrium rates usually are much slower than initial rates because the soil materials are saturated at equilibrium. Equilibrium rates are limited by the least porous layers of materials through which the water must move, with clays being almost impervious.

As soil materials become saturated and equilibrium rates of water movement through the materials are reached, water movement is either retarded by an impervious layer or moves into groundwater. In the area where water moves through the newly saturated materials into the groundwater, a mound is formed which effectively raises the elevation of the groundwater surface. The mound dissipates and the higher groundwater surface quickly returns to its normal elevation at a short distance from the newly saturated area. Depending on surface and subsurface soil material, characteristic groundwater surface elevations would be expected to increase in the immediate vicinity of the shoreline resulting from higher reservoir water levels. Long-term impacts to groundwater from increased reservoir water levels would be negligible.

4.7.1.7 Groundwater Quality

At the proposed new crest elevation, increased reservoir surface area would provide the potential for water to saturate surface soils and percolate to the groundwater. As water percolated through unsaturated soils and contacted soluble materials, there would be the potential for increased concentrations of TDS in groundwater.

The volume of soluble materials available to be dissolved and carried into groundwater by percolating surface water is extremely variable and depends heavily on TDS concentrations in the percolating water and chemical and physical characteristics of the soil materials. In any case, once the soluble materials were dissolved (leached) out of the affected soil material, the concentration of TDS in the percolating water would return to near-existing levels. Impacts to groundwater quality from increased reservoir levels would be minor in the short term and negligible in the long term.

4.7.1.8 Surface Water Quality

Construction activities have the potential to increase the turbidity (or suspended sediment) in the reservoir and downstream in the Tongue River. Dam rehabilitation and construction of the spillway stilling basin, coffer dams, and destruction of the coffer dams have the potential to increase turbidity of water in the reservoir and river. Scheduled construction drawdowns or low-flow periods, causing short-duration increases in turbidity, could be expected throughout the construction period.

Short-term impacts to reservoir and downstream water quality from increased turbidity during construction would be minor to moderate.

Flows into the Yellowstone River from the Tongue River will be reduced with the construction alternatives. Average annual flow of the Tongue at the confluence with the Yellowstone at present is 303,000 afy, average annual flow of the Yellowstone at this point 8,237,000 afy. The Tongue contributes only 3.6 percent to the Yellowstone's flow. TDS concentrations in the lower Tongue are about 490 mg/l. This is roughly comparable to TDS concentrations in the Yellowstone at the confluence. Thus, the effects on the Yellowstone of reducing Tongue River flows would be negligible.

Maximum measured arsenic concentrations in the Yellowstone River at Miles City are approximately nine micrograms per liter. With the rehabilitated project, the worst case scenario involving full Wyoming development and resulting in zero inflows from the Tongue River into the Yellowstone River, arsenic concentrations in the Yellowstone would increase to 11 micrograms per liter, which is well below the new state standard of 18 micrograms per liter. Therefore, project-related impacts to arsenic concentrations in the Yellowstone River would be negligible. See **Section 4.24.1.7** for additional information regarding arsenic concentrations in both the Tongue and Yellowstone Rivers.

4.7.1.9 Flood Events

Construction of the Tongue River Dam substantially changed the peak flood flows in the valley downstream of the dam (**see Figure 2-5** and **Table 4-4**). For comparing pre-dam and existing conditions, it is assumed the pre-dam condition is equal to the reservoir inflow. In general, the existing spillway reduced flood peaks in the downstream valley by 60 percent.

Projected flood flows (in the first 10 miles of the river below the dam) under each construction alternative are summarized in **tables 4-4, 4-5, 4-6, and 4-7**. The characteristics of various flood flows associated with these proposed alternatives, pre-dam conditions, and existing conditions are described in terms of peak discharge (cfs), topwidth (width of flooding) of flood flow (ft), area of the floodplain (acres per mile), and depth of flood flow (ft). Additional discussions regarding spillway design flood selection, dominant discharge, and flood events may be found in **Appendix E**. Pre-dam conditions are shown to illustrate flows in case of a dam failure.

The project sponsors agree to abide with all floodplain regulating requirements, including redesignating floodplain areas (downstream and upstream) as necessary. The project sponsors will continue to work with the State Floodplain Management Program during final design and permitting for the project.

4.7.1.10 Reservoir Evaporation

Both construction alternatives would result in an increase in annual evaporation from the reservoir: from 5,090 to 6,650 afy. This 30 percent increase in annual evaporation (1,560 afy) represents only 0.5 percent of the average annual inflow (332,000 afy) to the reservoir. The hydrologic impacts of increased reservoir evaporation would be negligible in the short and long terms.

TABLE 4-4: Comparison of Flood Peaks (cfs)

Flood	Pre-Dam (Inflow)	Existing Spillway	Labyrinth Spillway	RCC Spillway
5-Year	9,993	4,575	7,042	4,727
10-Year	13,108	5,608	9,143	6,437
25-Year	17,646	6,711	13,171	9,790
50-Year	21,377	8,344	15,792	10,444
100-Year	25,410	10,249	18,928	11,135
500-Year	35,897	15,889	22,743	15,694

Source: DNRC 1994.

TABLE 4-5: Average 100-Year Topwidth for Four Scenarios

	TopWidth *feet*	Change *feet*	% Change
Pre-Dam	556	195	54
Existing	361	0	0
Labyrinth Weir	467	106	29
RCC	387	27	7

Source: Morrison-Maierle/CSSA 1994.

TABLE 4-6: Average 100-Year Floodplain Area for Four Scenarios

	Acres/Mi	% Change
Pre-Dam	61	30
Existing	47	0
Labyrinth Weir	57	21
RCC	50	6

Source: Morrison-Maierle/CSSA 1994.

TABLE 4-7: Average 100-Year Flood Depth for Four Scenarios

	Depth	Change *feet*	% Change
Pre-Dam	15.44	5.00	48
Existing	10.44	0.00	0
Labyrinth Weir	13.50	3.06	29
RCC	10.81	0.38	4

Source: Morrison-Maierle/CSSA 1994.

4.7.1.11 Dam Breach Event

For purposes of this analysis, a dam breach is the rupture that would remove the dam embankment, and the associated sudden release of reservoir contents. Two dam breach scenarios were evaluated. The discussion and results of the evaluations are presented in **Appendix E.** The scenarios included a clear-weather breach, associated with an earthquake or problem internal to the dam, and a breach associated with the probable maximum flood on the Tongue River. Both scenarios produce substantial discharges and wave characteristics at downstream locations. (Detailed mapping of dam breach inundation is on file at DNRC.)

The impacts of the breach scenarios are not considered direct impacts of project alternatives but rather as reasons that the dam and spillway are classified as high hazard. The hazard classification and unacceptable risk of failure are reasons that construction alternatives 1 and 2 are proposed.

4.7.1.12 Long-term Results of Dam Failure

If the dam failed, the 100-year flood, and floods of more frequent recurrence intervals, would be characterized by the pre-dam discharge, topwidth, floodplain, and flow depth presented in **tables 4-4, 4-5, 4-6, and 4-7** after the breach occurred. These impacts would be major and significant.

This determination of significance is based on the fact that the 100-year flood flow would not be largely contained in the downstream channel as it is under existing conditions. Downstream flood damage would include threats to human life, property, livestock, and agricultural land. Flood damage could also include stream channel meandering, land parcels being cut off and isolated, and damage to vegetation and wildlife. Downstream impacts of the 100-year flood event after dam failure would be moderate to major and significant in the short and long terms.

4.7.2 Effects Unique to Alternative 1

During construction, the reservoir would be maintained at the highest possible volume, estimated to be between 9,000 and 30,000 af for the labyrinth weir alternative. This level would be governed by safe operating limits for the proposed construction activities.

Peak flood discharges for the labyrinth weir alternative are presented in **Table 4-4** for six design floods. Peak discharges for the six design floods increase by an average of 43 percent over existing conditions under the labyrinth weir alternative. The labyrinth weir design increases the spillway's capacity to pass water without increasing spillway width. During flood events of 25-year recurrence interval and above, flows exceed the capacity of the downstream channel (**see Appendix E**). The average topwidth of the 100-year flood event would be 467 feet for Alternative 1. When compared to the existing condition of 361 feet, this is an increase of 23 percent.

Alternative 1 increases the 100-year floodplain area by 10 acres per mile for a 16 percent increase over existing conditions. This alternative also increases the flood depth for the 100-year event by 3.06 feet, or a 23 percent change from existing conditions.

The change from Alternative 1 in the characteristics of the 100-year flood as measured by increased peak discharge, increased topwidth, increased floodplain, and increased flow depth are considered to be

significant. This determination of significance is based on the fact that the 100-year flood flow would not be mostly contained in the downstream channel as it is under existing conditions. Downstream flood damage would include threats to human life, property, livestock, and agricultural land. Flood damage could also include stream channel meandering, land parcels being cut off and isolated, and damage to vegetation and wildlife. Downstream impacts of the 100-year flood event would be moderate to major and significant in the short and long terms.

If Alternative 1 were selected, a possible condition of the local Floodplain Development Permit for the project might be the commitment to mitigate effects of increased flood flows. Affected property owners would have input into the permitting process.

4.7.3 Effects Unique to Alternative 2

During construction, the reservoir would be maintained at the highest possible volume, estimated to be between 9,000 and 45,000 acre feet for the RCC spillway alternative. These levels would be governed by safe operating limits for the proposed construction activities.

The characteristics of the 100-year flood and lesser events under the RCC alternative are presented in **tables 4-4, 4-5, 4-6 and 4-7**. Comparing peak discharge, topwidth, floodplain area and flow depth for the 100-year flood under the RCC alternative to existing conditions results in minor differences. The RCC maintains the approximate capacity of the existing dam to pass water at a given spillway width.

While the 100-year flood event characteristics increase under the RCC alternative when compared to existing conditions, the changes are minor (up to 7 percent). The downstream impacts of the 100-year flood event under the RCC alternative would be negligible in the short and long terms.

4.7.4 Effects From Alternative 3

Under the no-action alternative, reservoir operations and downstream releases would remain at current levels. Ice jam occurrences and coal mine pits seepage inflows would remain the same and the discharge and recharge characteristics of groundwater would remain unchanged. Ground and surface water quality would remain at existing levels. Impacts of the no-action alternative on reservoir operations, releases, ice jamming, coal mine pit seepage, surface water quality, and groundwater quality and quantity, would be negligible. The existing dam and spillway would continue to route flood events as described in **tables 4-4, 4-5, 4-6, and 4-7**. The downstream impacts of the 100-year flood event (without considering dam failure) under Alternative 3 would be negligible in the short and long terms.

The existing dam and spillway are classified as high hazard. The potential for loss of life drives the hazard classification. Without repair, the existing dam has an unacceptable risk of failure. For a description of a breach or dam failure, see previous discussion under Dam Breach Event and Long-Term Results of Dam Failure. After a breach event, the downstream impacts of the 100-year flood would take on pre-dam characteristics that would be significant.

4.7.5 Cumulative Effects

Construction of the Tongue River Railroad would include five bridges between the Tongue River Dam and Four Mile Creek. While a final construction schedule for the railroad and the five bridges has not been prepared, if bridge construction were simultaneous with proposed project construction, effects on downstream turbidity could be cumulative. The cumulative effects could be moderate to major in the short term and negligible in the long term.

4.8 WETLANDS

4.8.1 Effects Common to the Construction Alternatives

Wetlands are unique communities which provide many benefits to man. Some of these benefits include erosion protection, water quality enhancement, flood water storage, groundwater

recharge and habitat for important wildlife species. Congress recognized the importance of wetlands in the Clean Water Act which identifies them as special aquatic sites and gives them an extra measure of protection. Completion of the proposed work will inundate approximately 314 acres of wetlands which were delineated using the 1987 Corps of Engineers wetland Delineation Manual. Included in these 314 acres are 160 acres of sandbar willow wetland, 94 acres of water smartweed wetland, 5.4 acres of cattail marsh, 3.1 acres of tufted foxtail wet meadow, and 51 acres of mixed inclusions. The functions and values associated with these wetlands will also be lost. All these wetlands are below elevation 3,422 feet, the existing project ordinary high water mark. These acres of jurisdictional wetlands will be affected by the project, even if the reservoir level is not raised. To offset these losses, the project sponsors are developing a mitigation plan to replace lost wetland functions and values. The mitigation plan calls for both the creation of new wetlands and the enhancement of existing wetlands, and the utilization of natural regeneration of wetland vegetation types. Additional considerations were: 1) that mitigation wetlands be created as close to the project site as possible; and 2) that lands affected by mitigation measures be prioritized to avoid the conversion of high quality upland habitat (e.g., native prairie, woody draws, and forest communities). All wetland mitigation sites will be evaluated for adequacy of water supply, projected wetlands functions and values, and benefits that would result from mitigation. Projected functions and values of future created or regenerated wetlands will likely differ from those at present. It is anticipated that the area around the reservoir will contain more wet site gramminoids and annual forbs and less sandbar willow.

A draft copy of the Tongue River Basin Project Section 404(b)(1) Guideline Evaluation is included in **Appendix I**.

4.8.2 Effects From Alternative 3

Wetland conditions at Tongue River Reservoir would remain similar to existing conditions under the no-action alternative, except in the case of dam failure. Dam failure would result in the long-term loss of wetlands that have become established on the reservoir margin. This loss would be temporary because new wetlands would form along the stream channel that would flow through the drained reservoir.

4.9 AQUATICS/FISHERIES

4.9.1 Effects Common to the Construction Alternatives

4.9.1.1 Drawdown Effects Within the Reservoir

After installation of the coffer dam across the entrance to the existing spillway in the spring of 1997, and during the first construction season, reservoir contents would be maintained at the highest possible volume governed by safety. Maximum reservoir storage would be 30,000 af for labyrinth weir or 45,000 af for RCC. These maximum reservoir pool capacities are comparable to the current reduced maximum and median storage capacity of about 40,000 af and 29,000 af, respectively. Therefore, negligible to minor impacts to the reservoir fisheries would be expected from this activity when compared to present operations.

During the fall of 1997, reservoir storage capacity would be reduced to about 9,000 af (elevation 3,390.5 feet) by mid-October in order to repair the existing low level outlet works. This 9,000 acre-foot reservoir pool was identified during discussions among the project sponsors, DFWP and USFWS, as the minimum acceptable impoundment during this phase of construction. When the pool elevation reached within about a foot of the screen grates at the top of the intake, a circular coffer dam (sheet piling and earthen material) would be placed around the structure prohibiting flow into the outlet works. Median pool capacities are about 23,000 af for the month of October, or about 14 feet higher than the intake grate structure. Rehabilitation of the outlet works is proposed to begin with a gradual reservoir drawdown at the conclusion of the irrigation season in late September under both construction

alternatives. Pool capacities would not be expected to increase after installation of the coffer dam until spring runoff in 1998, due to planned releases of run-of-river flows through the winter months.

Reservoir capacities would be expected to be about 9,000 af from mid-October to April of the following year. Volumes of 9,000 af result in a reservoir surface of about 700 acres, with average and maximum depths of 12.7 feet and 26.1 feet, respectively, or about half of the reservoir's normal over-winter size. Since DFWP contends that reservoir capacities need be maintained at no less than 25,000 af for the benefit of fisheries, there would be impacts associated with this activity. However, the 9,000 af capacity should easily over-winter a significant fraction of adult fish and moderate temperature fluctuations, increasing the potential for successful spawning and egg incubation (Phillip Stewart, DFWP, in a letter to Edward Pettit, February 15, 1995). The schedule for rehabilitation of the outlet works would be expected to alleviate the potential of large fish kills in the reservoir attributable to low dissolved oxygen in the winter months or lethal temperatures during the summer. The magnitude, importance, and ultimate duration of impact depend on actual climatological conditions encountered and length of time pool volumes remained low.

If low reservoir capacities extended into the summer of the second construction season, reduced areas of shallow littoral zone (along the edge) habitat could result. These areas are used by fish for spawning and rearing of juveniles of many species. Lower pool capacities could tend to favor warm-water fish over cool-water species since reservoir temperatures would more closely parallel those of the river inflow, typically higher than that of the reservoir during summer months. The loss of reproductive and protective habitat and increased water temperature could result in lower success or higher mortality for this year class of the reservoir fisheries. This loss could be compounded in that low volumes in the pool also would concentrate the fish, leading to higher losses to both smaller fish species and juvenile game/sport fishes due to increased opportunity for predation. Increased numbers of fish also could be expected to be swept through the outlet works because of higher fish concentrations in proximity to the intake structure. Fish mitigations discussed in **Chapter 2, *Proposed Mitigation and Monitoring***, would compensate for construction-related losses.

Increased turbidity and sedimentation resulting from constructing a bridge, coffer dams, and excavation activities could stress the aquatic community and cause short-term impacts on periphyton, macroinvertebrates, and fish spawning. Effects of sedimentation on aquatic life are well documented and include: clogging and abrading of respiratory surfaces, entombing of eggs and other life stages, avoidance of affected habitat, reduction of primary production, and reduction in catchability of fish (an indirect effect). The fisheries mitigation proposed would compensate for anticipated losses downstream of Four Mile Creek. However, the river fisheries likely could not avoid all the effects of sedimentation.

Direct impacts of drawdown and reduced pool capacities on reservoir fisheries would be minor to moderate in the short term and negligible to minor in the long term. If, however, construction-related activities were combined with a low-probability naturally occurring event, such as low precipitation and high temperatures in successive years, the combined effect would have the potential to be moderate to major and significant and require plantings of game/sport fish species to achieve appropriate mitigation.

Aggregate at Site No.1 would be mined when reservoir levels are low, so there should be no impact to aquatics/fisheries during aggregate mining.

4.9.1.2 Reduction in Flows Downstream of the Dam

Planned downstream releases of water during construction would equal run-of-river flows and if possible would be sufficient to satisfy the T&Y diversion water right of about 190 cfs for both construction alternatives. The exception to this flow regime would take place after the 1997 irrigation season during the rehabilitation of the low level outlet works and could extend to spring runoff 1998. Planned flows for this time frame would be about equal to the inflow to the reservoir. Monitoring of aquatic life would be performed by DFWP (**see Chapter 2, *Proposed Mitigation and Monitoring***).

Water temperatures would generally be run-of-river and within the natural ranges for biota.

Impacts to aquatic life would be minor and short term for the lower reach of the river, and minor to moderate in the short term in the reach immediately below the dam. In the long term, impacts to the river in general would be minor.

4.9.1.3 Postconstruction Operations

Two of the goals of the reservoir operations plan are to provide for more stable pool elevations as well as less fluctuation in downstream releases from the dam. Increased storage volumes and reservoir operations that promoted stability within the reservoir and river downstream would be beneficial to fisheries.

Inundation of areas containing woody riparian vegetation would provide new spawning substrate and more secure short-term (until it decomposed) habitat for smaller or younger fish. About a mile of upstream river habitat would be replaced by reservoir, but the effect on the system in general would be negligible, with habitat characteristics eventually returning to ambient conditions.

Ability to discharge larger volumes of cooler reservoir water into the river during the summer months could benefit cool-water fish species and possibly extend the range for trout below the dam after construction was complete. The river, however, would retain the attributes of a warm-water stream. Impacts of the rehabilitated project on aquatic life, including implementation of the proposed operations plan, would be minor to moderate and beneficial in the long term. For further discussion of impacts on aquatics/fisheries, see **Sections 4.24, 4.25, and 4.26**.

4.9.2 Effects From Alternative 3

The no-action alternative would extend the status quo of reservoir operation and subsequent river flows for an indefinite period. DNRC has concluded the dam has an unacceptable risk of failing even when operated at a reduced level.

The no-action alternative would have no effect on current aquatic organisms and fisheries resources unless the dam failed. At dam failure, the reservoir fishery habitat would cease to exist and reservoir and downstream channel scouring would cause substantial destruction of aquatic and fisheries habitat.

The no-action alternative's ultimate impact on aquatic organisms and fisheries would be negligible in both the short and long terms unless the dam failed. Impacts if dam failure occurred would be major and significant in the short term but would eventually return to pre-dam conditions.

4.9.3 Cumulative Effects

The proposed Tongue River Railroad (TRR) preferred alternative's planned route would cross the river five times in the first 10 miles downstream of the dam (to Four Mile Creek). This could have substantial negative effects on the aquatic resources in this river reach.

Since the TRR project and the proposed project could be constructed during the same time frame (1997-1998), cumulative effect on aquatic biota related to sediment or total suspended solids could increase under this scenario. Cumulative effects under possible low-flow conditions would be major and significant in both the short and long terms and the reach of river affected would likely extend further downstream.

4.10 WILDLIFE

4.10.1 Effects Common to the Construction Alternatives

4.10.1.1 Terrestrial Wildlife

An increase in reservoir water level would inundate much of the present block of woody and herbaceous riparian habitat at the south end of the reservoir. Loss of this and other habitat types described below would displace white-tailed deer population and

some varieties of birds in the short-term. Some species, especially cormorant and great blue heron would continue to use the dead (flooded) trees as long as they remained standing and could relocate upstream to available habitat. Other species (i.e., some warblers, vireos, orioles) that show a strong preference for shrub or deciduous trees would be moderately affected due to the loss of the shoreline band of riparian vegetation.

The current band of woody vegetation around the reservoir is heavily concentrated within an elevational range of some 8 feet, and in a relatively large, flat area at the southern end of the reservoir occupying essentially the same elevation. Because of generally steeper shoreline slopes at the new water elevation, the woody band would be narrower and discontinuous (confined to perhaps 2 to 4 feet of elevation in the short term). In the long term, wave action would create a more gradual slope, allowing some of the woody band to reestablish. The flat, heavily vegetated area at the southern extreme of the reservoir would also be much smaller because of reservoir inundation combined with steeper terrain. A smaller area along the east shoreline of the impoundment appears to offer some limited opportunity for the establishment of woody riparian vegetation. These areas that have the potential for the natural reestablishment of woody and riparian vegetation would eventually offset some of the loss of the wildlife habitat expected from construction of the project.

A portion of the 227 acres of riparian wildlife habitat flooded by the project would become reestablished naturally. However, the permanent loss of some of this habitat type, having important value to many forms of wildlife, is expected. Expected net losses of grassland and scrub/forest wildlife habitats are 139 acres and 25 acres, respectively.

Riparian habitat losses would be mitigated in accordance with the wetland and riparian mitigation plan (**see Chapter 2, *Proposed Mitigation and Monitoring***). Neotropical migrants would likely overfly the reservoir and use riparian areas above and below the reservoir during the period of riparian reestablishment. Thus, the impact of songbirds (many of which are neotropical migrants) would be minor in the short term and negligible in the long term. Impacts on other terrestrial wildlife from the construction alternatives would be moderate to major and significant in the short term and minor in the long term. For further discussion of impacts on wildlife, see Implementation of Fish and Wildlife Habitat Enhancement Features.

Terrestrial species would be displaced by construction activities like aggregate mining and staging area activities. Aggregate Site No. 1 would be located at Campers Point recreation area and does not contain suitable wildlife habitat. Aggregate Site No. 2 below the dam provides about 36 acres of grassland habitat with a few cottonwood trees. Mitigation for this site would involve efforts to avoid mature trees and recontouring and reseeding.

4.10.1.2 Waterfowl

Drawdown during construction could considerably reduce the use of the area by migrating ducks in the short term. The limited loss of woody and herbaceous riparian, and grassland wildlife habitats would also adversely impact waterfowl. Some loss of Canada goose habitat and limited loss of nesting areas by duck species would occur. Canada goose, cormorant and great blue heron nesting at the south end of the reservoir and nearby would be dislocated; some of this may become reestablished further upstream if suitable habitat remains available. Some cavity-nesting species (wood ducks) would continue to use flooded trees as long as they stood. Impacts to waterfowl habitat would be mitigated in the long term by proposed habitat mitigation and enhancement plans. Impacts on waterfowl from the construction alternatives would be minor in the short term and negligible in the long term.

4.10.1.3 Threatened, Endangered, and Candidate Species

Based upon analysis of the construction alternatives as compared to the no-action alternative, current and potential status of the species in the project area, and other land use activities in the area, along with incorporation of mitigation measures, a determination of no adverse effect is concluded for all T&E species. For more details on determination of impacts, **see Appendix B**.

Both construction alternatives involve a 4-foot raise of the spillway crest, as well as institution of fish and wildlife enhancement measures. Therefore, with some minor differences attributable to construction techniques, effects on T&E and candidate species are judged to be identical.

Impacts to the bald eagle include displacement during construction from the area immediately downstream of the dam. Displacement from the area would not be considered a significant impact due the amount of suitable habitat extending several miles downstream of the dam. However, if this upstream area provided the only open water during cold-weather, effects on the bald eagle could be greater. Enough open water to attract waterfowl and allow fishing is very important for eagles wintering in the area. If eagles were seen near the construction site, activities would cease and consultation would take place with Reclamation and USFWS. Discharge of toxic chemicals into the waterway could cause direct mortality, or indirectly impact the species by reducing fish and waterfowl abundance. Toxic handling stipulations in the construction contracts would be followed to minimize this danger. If new powerlines were required, they could cause direct mortality from collisions or from electrocution. New powerlines would be "raptor-proofed" in accordance with USFWS practices to minimize these effects. Increased vehicular activity during the construction period could result in a larger number of road killed big game. Bald eagles foraging on the increased carrion source would be potential victims of vehicular collision. Short-term turbidity increases in the river resulting from construction activities could reduce fishing success or opportunity for the eagles. Increased traffic near the active nest 2.5 miles downstream of the dam during the late winter to mid-summer nesting fledging period could disturb the eagles and result in nest abandonment. The proximity of the nest to the county road greatly elevates the risk of disturbance from vehicular traffic. The nesting eagles do not appear to be overly disturbed by the existing (sparse) amount of vehicular usage of the road.

The no-action alternative assumes dam failure. Loss of the dam would mean that open water below the dam would be lost during winter, affecting the foraging opportunities for the eagle.

The limited occurrence of the peregrine falcon in the project area makes chances of impacts to the species remote. However, the discussions above for the bald eagle regarding open water during winter, threat of toxic spills, and danger from new powerlines apply for falcons that may migrate through the project area. Loss of the dam in the no-action alternative would reduce foraging opportunities for the falcon.

No adverse impact is anticipated for either the piping plover or least tern due to the paucity of suitable habitat in the project area. However, suitable to marginally suitable habitat may become available below the high water mark in the reservoir during drawdown for construction. Use of these areas would not be expected unless high water levels or other environmental factors precluded these species the use of more suitable areas in the Missouri, Milk, and Yellowstone drainages. If piping plovers or least terns establish nesting areas in the lowered pool area they may be displaced after refilling of the reservoir.

Since pallid sturgeon are not known to occur in the project area, potential for adverse impacts are low. Reduced river flows during the construction period may reduce the suitability of the habitat at the mouth of the river. However, lack of suitable habitat does not appear to be a major limiting factor for pallid sturgeon in the vicinity of the project area. Any pallids affected by the reduced flows could retreat to the Yellowstone River where presumably suitable habitat is readily available. Accidental discharge of toxic chemicals could adversely affect this species, but a discharge would have to be of great magnitude to have a perceptible impact nearly 190 miles downstream.

Since the black-footed ferret is not believed to occur in the project area, potential for adverse impacts is remote. One small, isolated, black-tailed prairie dog colony occurs on the east side of the reservoir near the mouth of an ephemeral stream. This colony is not of suitable size to support black-footed ferrets. The colony may be gradually affected by raised groundwater levels following refilling of the reservoir. It is anticipated that prairie dogs affected in this manner would likely relocate a short distance upgradient of their present location.

4.10.2 Effects From Alternative 3

Under the no-action alternative wildlife and waterfowl would continue to use the habitat in the project area as they do under current conditions. However, should dam failure occur there would be a loss of habitat and potential dislocation of wildlife and waterfowl. Impacts on terrestrial wildlife, and waterfowl under the no-action alternative would be negligible, with the potential to become major and significant under dam failure. Under dam failure in the long term, a more natural flow regime would become reestablished and would ultimately benefit riparian vegetation and wildlife.

4.10.3 Cumulative Effects

The proposed project would inundate wildlife habitat in the area upstream of the dam, resulting in short-term displacement of fauna currently using this area. White-tailed deer, in particular, would be competing for fewer acres of protective cover and thus be more exposed to natural predation and hunting pressure. If the TRR project was constructed during the same time frame, a total of about 18 miles of riparian and upland habitat would be undergoing disturbance over about 2 years. Increased pressure on wildlife resources would occur due to additional vehicular traffic and higher population and use of the reservoir and downstream. Cumulative impacts on big game and waterfowl could be moderate to major in the short term.

4.11 VEGETATION

4.11.1 Effects Common to the Construction Alternatives

4.11.1.1 Increased Reservoir Water Surface Elevations

Potential impacts to vegetation would result from repair of the Tongue River Dam, operation of the dam to raise reservoir water levels by 4 feet during typical years, development of aggregate sites, construction of approximately 3 miles of new county road alignment, widening the existing county road, development of wetland and riparian mitigation sites, and relocation of Tongue River State Park. For discussion of impacts to vegetation from proposed enhancement, see **Section 4.26**.

Repair of the spillway and operation of the dam would increase reservoir water levels to above elevation 3,425 feet for several months in a typical year (**see Figure 4-5**), inundating and killing existing shoreline vegetation below that elevation. Existing stands of four common riparian woody plant species (cottonwood, green ash, peachleaf willow, and sandbar willow) and herbaceous plants present in this zone likely would be eliminated. Some of the vegetation growing below elevation 3,429 feet would also be killed due to inundation for substantial periods during the growing season. Western wheatgrass and silver sage communities below elevation 3,429 feet would die within a few years as would Rocky Mountain juniper and ponderosa pine growing below elevation 3,431 feet. Although reservoir water levels would not exceed 3,429 feet, some plants above this elevation would be jeopardized. Wave action and water-saturated soil, from capillary movement within the rooting zones of upland species such as juniper and ponderosa pine, would eventually kill these plants. Unlike cottonwood and willow, juniper and ponderosa pine cannot survive water-saturated soils within their rooting zones for extended periods during the growing season.

Part of the vegetation losses resulting from increased reservoir water levels would be offset due to reestablishment of riparian communities around the reservoir margin in a narrow zone from about elevation 3,429 to 3,431 feet. Wave action and increased soil moisture from upward capillary movement would create an environment favorable to the growth of sandbar and peachleaf willow and Great Plains cottonwood. Wave action would create nonvegetated, bare soil that would be moist for most of the growing season, and exposed to full sunlight. These conditions are ideal for seed germination and growth of willow and cottonwood.

Although riparian vegetation would quickly establish on the new reservoir margin, the elevation zone

amenable to colonization (3,429 to 3,431 feet) would be considerably smaller than the zone now vegetated by riparian communities (3,417 to 3,425 feet). Not only would the elevational zone be reduced, but the surface area of reservoir margin suitable for establishment of riparian vegetation would be disproportionately reduced.

Under existing conditions, the topography of the southern portion of the reservoir shoreline is characterized by relatively large areas of nearly flat or gently sloping ground. These gently sloping shorelines are subject to inundation and exposure with fluctuations of water levels of only a few feet.

Under the construction alternatives, the existing large, nearly flat areas typically would be inundated (**see figures 2-4, 4-2, and 4-5**). Due to steeper topography above elevation 3,425 feet, the new reservoir shoreline would consist of less gently sloping ground; consequently, minor water-level fluctuations would not expose disproportionately large shoreline areas amenable to growth of riparian vegetation. Based on studies conducted by the Montana Riparian Association at the University of Montana, Miles and Hansen (1992) determined that the elevational band between 3,425 and 3,429 feet has only 70 percent of the area of the band between 3,420 and 3,425 feet.

Not only would shoreline habitats capable of sustaining riparian vegetation be reduced, but growth of woody vegetation on the reservoir margin might be inhibited by ice formation on the reservoir during winter and ice scour during spring breakup. Reservoir operations will be governed by the Reservoir Operations Advisory Committee (described in **Section 4.7.1.1**). Typically reservoirs are held at below full pool during winter. In the event the reservoir were at full pool, some scouring might be possible. During typical years, with proposed operation of the reservoir (**see Figure 4-5**), water levels would gradually increase from 3,425 feet in October to maximum pool (3,429 feet) by mid-to-late March. During the latter part of March, and through April, reservoir levels would be lowered to 3,425 feet. Water-level fluctuations, while the reservoir was frozen, could cause ice to shift and shear off or uproot woody plants frozen in the ice. Depending on winter reservoir levels, plants growing below elevation 3,429 feet could be vulnerable to damage and mortality from shifting ice.

Removal of existing vegetation from increased reservoir water levels, wave action, and ice movement may favor the spread of existing salt-cedar, a noxious, non-native shrub that aggressively colonizes disturbed riparian areas, and displaces more desirable native plants. Dense stands of willows and cottonwoods are less likely to be rapidly colonized by salt-cedar than are bare nonvegetated shorelines, because established vegetation competes with invading species for sunlight, nutrients, and growing space. If salt-cedar was not controlled, then there could be major long-term impacts to existing native vegetation. If it was controlled, then short-term impacts on salt-cedar and nontarget species would occur, however, long-term impacts would be beneficial.

To avoid shoreline erosion, the project sponsors are investigating vegetation cover, gabions, or placement of up to 91,000 cubic yards of riprap along portions of the reservoir margin. Where gabions or riprap were used, reestablishment of riparian vegetation would be affected. Little vegetation would likely grow on sites armored with gabions or riprap. Impacts on vegetation from increased reservoir water surface elevations associated with construction alternatives would be moderate in the short and long terms.

4.11.1.2 Road Construction

Construction of about 3 miles of new county road alignment (**see Figure 2-4**) would directly remove about 33 acres of native vegetation, assuming an average disturbance width of 80 feet (**see Figure 2-7**). Native plant communities that would be destroyed are: 19 acres of big sagebrush/grassland, 3 acres of riparian western wheatgrass, and 11 acres of Rocky Mountain juniper/grassland. Potential widening of the existing road would destroy additional areas of native vegetation, primarily open forest communities of Rocky Mountain juniper and ponderosa pine. Construction of new roads and widening of existing roads would increase the potential for introduction and spread of noxious

weeds. Vehicles traveling from areas with noxious weed infestations often carry and disperse weed seeds to uninfested areas. Impacts on vegetation from road construction would be minor in the short and long terms if weeds did not become established. If weeds replaced desirable native plants, local impacts to vegetation would be major in the short and long terms.

4.11.1.3 State Park Relocation

Tongue River State Park would be relocated upslope from its present location to accommodate increased reservoir water levels. Construction of new facilities (e.g., campsites, boat launch, latrines, and waste disposal stations, and concessions) would directly remove vegetation, mostly big sagebrush/grassland. In addition to direct removal of vegetation (about 23 acres), plant communities in and adjacent to the campground would be adversely affected by human trampling. Disturbance of native plant communities and a large influx of vehicles would increase the potential for spread of noxious weeds. Impacts of state park relocation on vegetation would be minor in the short and long terms.

4.11.1.4 Construction Staging Area

The construction staging area, proposed to be located downstream of the dam and at an existing fishing access site, would remove vegetation or severely degrade 36 acres of vegetation by compaction and disturbance from construction activities. Vegetation in the staging area consists of cottonwoods and other riparian species. Efforts (e.g., fencing) would be undertaken to preserve as many mature cottonwoods in the staging area as possible. Impacts to vegetation at the construction staging area would be major in the short term and minor in the long term unless noxious weeds replaced desirable native plants. Then local impacts to vegetation in the staging area would be major in the long term.

4.11.1.5 Wildlife - Wetland Mitigation

Wildlife and wetland mitigation (**see Chapter 2, *Mitigation and Monitoring*** and ***Appendix I***) would include construction of wetlands on sites currently vegetated with a predominance of upland plants. The conversion of upland sites to wetlands would result in the loss of plant species not adapted to anaerobic, water-saturated soils and replacement of these plants with species adapted for life in marshes, ponds, and other sites with abundant free water or shallow groundwater within their rooting zones.

Proposed control of salt-cedar and other noxious weeds would affect development of plant communities on reservoir shorelines. If herbicides were used, nontarget plant species could be killed. If physical methods were used, seedlings and saplings of cottonwoods and willows, also likely to be present at sites with salt-cedar, could be adversely affected over the short term. Over the long term, removal of salt-cedar would allow desirable riparian native plant communities, essential wildlife habitat, to establish without additional competition.

4.11.1.6 Ethnobotanical Resources

None of the 62 ethnobotanical plant species inventoried in the vicinity of the Tongue River Reservoir and valued by Native Americans are rare or uncommon in eastern Montana. Most of these plants are readily accessible to people involved with collection and use for ethnobotanical purposes and none are restricted to habitat below elevation 3,440 feet or 12 feet above the new high-pool elevation (Aaberg and Tallbull 1993). The proposed action would have negligible impacts on regional ethnobotanical resources.

4.11.1.7 Aggregate Mining

Extraction of soil and rock (aggregate) and stockpiling of overburden would destroy up to 60 acres at Aggregate Site No. 1. Vegetation that would be lost at Site No. 1 is predominantly big sagebrush/grassland. Some of the area at this site has been altered by a network of roads and campgrounds. Impacts to Site No. 1 vegetation would be minor in the short and long terms.

Aggregate mining would destroy up to 10 acres at Site No. 2. Vegetation that would be lost at Site No. 2 consists of cottonwoods and associated riparian shrubs and herbaceous species.

4.11.2 Effects Unique to Alternative 1

Riparian vegetation downstream from the dam could be affected if major floods were greatly attenuated. Flood frequency and magnitude downstream from the dam would differ between construction alternatives; consequently, potential impacts to riparian vegetation downstream from the dam would also differ.

Flood peaks would be more frequent and of greater volume with a labyrinth weir spillway than with the existing spillway. Increased frequency and magnitude of floods would likely alter stream channel morphology through scouring and overbank flooding. Overbank floods would also deposit alluvium and create favorable conditions for regeneration of cottonwood and willow communities. Increased frequency of overbank flooding associated with Alternative 1 would probably favor maintenance of riparian communities dominated by cottonwood and willow.

4.11.3 Effects Unique to Alternative 2

With Alternative 2, impacts on riparian vegetation downstream from the dam would not appreciably change from existing conditions. The reconstructed dam and spillway would contain floods and discharge flows of similar magnitude and frequency to those occurring under existing conditions. Existing stands of cottonwoods on river terraces that have been protected from floods since construction of the dam would decline and eventually become dominated by shrubs, green ash, boxelder, Rocky Mountain juniper and, possibly, Russian olive, an aggressive, non-native tree.

Cottonwood communities on river bars, shorelines, and low portions of floodplain that are inundated by 25-year flood events or greater would continue to remain in early stages of ecological succession due to periodic high streamflows.

4.11.4 Effects From Alternative 3

Under the no-action alternative, plant communities would be maintained in their existing state. Cottonwood communities on downstream river terraces that have been precluded from periodic inundation by dam flood control would continue to age. Trees 70 years old and older would die. Vegetation on reservoir margins would be maintained in early stages of ecological succession by periodic inundation and wave action during periods of high water. Impacts of the no-action alternative on vegetation would be negligible both in the short and long terms. In the event of dam failure, portions of land exposed by draining of the reservoir initially would become vegetated by plants with the capability to colonize unvegetated substrate. There would be a high potential for noxious weeds to become established because of the very large area of disturbed habitat that would be available for exploitation. Eventually, the river would reestablish a channel through the exposed reservoir bottom and riparian vegetation dominated by willow and cottonwood would develop. Over time, native plants would become established on upland sites and prairie habitats would occupy most of the drained reservoir.

4.11.5 Cumulative Effects

Construction of Tongue River Railroad and the proposed project could cumulatively affect vegetation. Bridge crossings of the Tongue River and construction of the railroad through riparian vegetation would cause long-term losses of cottonwood, willow, and herbaceous plant communities within Tongue River Basin. Upland plant communities destroyed by railroad construction would incrementally increase regional losses of upland vegetation and, cumulatively, add to losses of vegetation that would be realized with the Tongue River Basin project. Cumulative impacts on vegetation would be moderate when considered in combination with the impact of Tongue River Railroad.

4.12 BIODIVERSITY

4.12.1 Effects Common to the Construction Alternatives

Impacts on biological diversity could result from the habitat alterations that would encourage the proliferation of noxious weeds, including salt-cedar on the reservoir shoreline. Typically, noxious weeds replace native plant species and form dense populations with low species and habitat diversity. Reductions in diversity of wildlife populations using habitats degraded by noxious weed infestations would also occur. For further discussion of impacts to Biodiversity, **see Section 4.26**.

The proposed project would probably not affect species diversity in aquatic habitats if adequate streamflows were maintained in the Tongue River and adequate volumes maintained in the reservoir. Native species would continue to coexist with introduced species.

Impacts to biological diversity would be minor in the short term and minor to moderate and beneficial in the long term (life of the project or longer) both locally and regionally. Impacts on biological diversity would depend on locations and types of mitigation and enhancement to be implemented. If currently disturbed lands, with reduced ecological functions and values were used for creation of wetlands or were enhanced by revegetation with a diverse mix of native plants, species diversity would increase and the project would be consistent with the objectives of ecosystem management.

4.12.2 Effects From Alternative 3

Taking no action would likely maintain species diversity at existing levels. In the event of dam failure, aquatic habitat would revert to terrestrial habitat. Fish and other aquatic organisms living in the reservoir would be replaced by birds, mammals, and other fauna capable of occupying terrestrial habitats. Reversion of habitat dominated by non-native species (i.e., non-native fish in the reservoir) to habitat occupied by predominantly native species would be consistent with the goals of ecosystem management if the economic and recreational values associated with the Tongue River Reservoir are disregarded.

4.12.3 Cumulative Effects

Mitigation measures to convert native prairie habitats to artificial wetlands would cumulatively reduce amounts of native prairie habitat remaining in the Northern Great Plains. Agricultural development, overgrazing, mining, residential development, and other activities have reduced native prairie and associated wildlife populations which have a strong affinity for native grasslands and shrublands. Cumulative impacts to biological diversity under the construction alternatives would be negligible if upland prairie habitats were maintained. If they were converted to wetland sites, impacts would be minor given the relatively small acreages of potentially altered habitat.

4.13 SOCIAL CONDITIONS

4.13.1 Effects Common to the Construction Alternatives

Impacts to community service providers, social well-being of residents, population, and housing resources occur when a significant number of workers and their families move into an area as a result of jobs either directly or indirectly created by a project and its related activities. As a result of the Tribal Employment Rights Office (TERO) agreement (see ***Economic Environment, Employment and Personal Income***), few, if any, new people are expected to move into the area due to employment opportunities created by the Tongue River Basin project. Therefore, construction or operation of the project would have negligible short- or long-term impacts on the population and demographic characteristics of the area. Negative short-term impacts, however, may be realized during preconstruction and construction phases due to increased commuter and truck traffic on local roads. Increased traffic may result in more traffic accidents,

stressing police, ambulance, and emergency room services. Short-term positive impacts due to increased employment opportunities for Northern Cheyenne members may enhance the social well-being of workers and their families. However, the impact on social-well being would be minor since only a 0.2 percent employment increase would occur (**see *Employment and Personal Income***). No long-term impacts to community services, housing, and social well-being are expected. Impacts of construction alternatives on social conditions would be minor and beneficial in the short term and negligible in the long term. For further discussion on social conditions, **see Section 4.26**.

Executive Order 12898 was issued to assure that "environmental justice" be considered in each federal EIS. The purpose of the order was to assure that no particular socioeconomic group, in particular low-income or minority, suffered a disproportionate share of impact from a federal project. Given the 1) relatively minor amount of employment associated with the project, 2) short-term nature of economic impact on agricultural practices due to construction drawdown, 3) TERO agreement, 4) agricultural mitigations proposed, and 5) location of the project away from lands associated with a specific socioeconomic group, environmental justice issues associated with this project appear to be negligible.

The construction alternatives will fulfill the Indian Trust Assets responsibility of the Department of the Interior. Primary intentions are carrying out the project are to provide beneficial water storage for the Tribe and to make the Tongue River Dam safe. Employment impacts are also beneficial both within and out of the basin. With the TERO agreement in place, a target of 100 percent of the local hire workforce would be hired from the Northern Cheyenne Tribe, a minority group with high unemployment and lower median incomes. This is estimated to be approximately 75 percent of the local workforce. See **Glossary** for definitions of "local hire" and "local workforce."

4.13.2 Effects From Alternative 3

Under Alternative 3, social conditions would maintain the status quo except as influenced by other future activities. Potential major and significant impacts could result from a dam failure as described in ***Hydrology***. Significance is determined from the probable loss of lives and property damage. Impacts of the no-action alternative on social conditions would be negligible in the short and long terms with the potential to become major and significant in the short term under dam failure.

4.13.3 Cumulative Effects

Cumulative impacts would result from construction and operation of the TRR. Construction activities would increase commuter and truck traffic on local roads which may result in more traffic accidents, stressing police, ambulance, and emergency room services. Long-term negative impacts would include increased fire hazards, stressing fire protection services.

4.14 ECONOMIC CONDITIONS

4.14.1 Effects Common to the Construction Alternatives

4.14.1.1 Employment and Personal Income

Estimated project employment would include jobs related to preconstruction, construction, and mitigation activities. Preconstruction work would include road improvement, aggregate extraction and preparation, and riprap hauling and placement, and would last about 18 months. Activities related to mitigation include coal-mine-flood-damage reduction, riparian planting, fencing, and state park improvements.

Seventy-five percent of all local workforce employees for preconstruction, construction, and mitigation are expected to be Native Americans hired from the Northern Cheyenne Tribe. A majority of the Native Americans hired to work on the dam rehabilitation are expected to be hired from the Northern Cheyenne Indian Reservation and most likely would commute to work at the project site. The remaining

employees (about 10 to 15 workers) would most likely be hired from outside the study area, depending on the location of the project contractor and employment requirements.

In addition to the estimated direct jobs created, some secondary employment, primarily in the trades and services and industrial sectors, may be created by construction-related activities. Using indirect to direct employment ratios associated with the construction of mineral developments in rural areas of Montana and North Dakota, about two or three secondary jobs (for about 1 year) may be created for each direct job associated with rehabilitation of the dam (Gilmore et al. 1982).

Indirect and direct employment due to construction-related activities is estimated to impact total projected Tongue River Basin employment by less than 0.2 percent (25 to 30 employees) over the construction period. The impact on Native American employment in the basin (assuming 75 percent of the local workforce employees are hired from the Northern Cheyenne Tribe) would be about 2 percent for about 1.5 years (**see Section 4.13.1**).

Wages and salaries (1993 dollars) due to construction-related activities should total between $1.7 and $1.9 million for the construction alternatives. In addition, further income may be realized from the local purchase of supplies and equipment by the construction company. Annual earnings statistics are not collected by Indian Reservation or by Tribe. However, if 75 percent of the local workforce employees are Northern Cheyenne, Tribal earnings should increase by about $1.4 million over the construction period.

Concession income associated with camping and fishing activities at recreation sites is likely to be negatively affected due to reduced visitation during construction. In 1992, gross concession income totaled about $43,000. Expected income losses could range from no loss to full loss of gross income for concessionaire income at the Tongue River recreation facilities.

Based on the foregoing information and assumptions, the short-term impacts on basin employment and personal income are expected to be minor and beneficial. Short-term impacts on Northern Cheyenne employment and income are expected to be beneficial and moderate. Long-term Tongue River Basin and Northern Cheyenne employment and income benefits are expected to be minor.

4.14.1.2 Agricultural Economy

During construction, the water level of Tongue River Reservoir would be lowered which may impact the amount of water that would be available for downstream users. About 4,000 acres of hay, silage, and small grain croplands that require full irrigation could be affected by construction at the dam site. In addition, 11,000 acres that receive partial irrigation from water stored in the reservoir, may not have sufficient water available for irrigation. Construction of the spillway may affect irrigation for most of two growing seasons. Agricultural production losses would depend on the amount of precipitation during the construction period.

Once construction was completed and water levels were attained in the reservoir, water would again be available for the 15,000 acres that depend on the reservoir for irrigation. Additional water also would be available for irrigation projects supported by the Northern Cheyenne. Estimates of increased agricultural sales are difficult to assess since the Northern Cheyenne have current unused water rights. Once the spillway was complete, the Tribe would have up to 40,000 afy of water available for irrigation during typical years. If all water rights were used and about 10,000 acres of land were available to be irrigated, the water potentially could be worth nearly $1.5 million (1990 dollars) per year in increased agricultural production.

Raising the water level of the reservoir and the potential land acquisition by DNRC could remove up to 4,600 acres of agricultural land from production in Big Horn County, Montana. Additional acreage could be lost to production due to acquisition for wildlife mitigation and enhancement. However, less than 0.1 percent of agricultural land in the county would be affected with little impact on total agricultural production in the basin.

Estimated impacts to the agricultural economy over the 2-year period range from no loss to $2.0 million depending on available moisture. Impact losses to total agricultural sales in the Montana Tongue River Basin due to dam rehabilitation are estimated to be less than 1.0 percent per year. (**See Chapter 2, *Proposed Mitigation and Monitoring***, for a discussion of agricultural mitigations.)

Based on the foregoing information and assumptions, the short-term impacts on the basin agricultural economy are expected to be negative, but not significant. Long-term impacts to the basin agricultural economy are expected to be minor. Long-term impacts to the Northern Cheyenne could be major, beneficial, and significant depending on their ability to use or sell additional water (rights). Impacts of construction alternatives on the agricultural economy would be minor in both the short and long terms.

4.14.1.3 Area Coal Mining

Following rehabilitation of the dam, the reservoir water levels typically would increase above current levels. The increased water levels would result in more groundwater seepage into coal mine pits. Measures proposed to mitigate economic effects on mines would be accomplished using additional power for pumping and greater pumping capacity, additional sediment pond capacity, and obtaining permission to increase annual discharge under the Montana Pollutant Discharge Elimination System from the Montana Department of Environmental Quality. (**See Chapter 2, *Proposed Mitigation and Monitoring*** for a discussion of coal mine mitigations.) Impacts of construction alternatives on area coal mining would be negligible in the short and long terms.

4.14.1.4 Public Sector Fiscal Conditions

Little in-migration of construction workers is expected over the duration of the project because of the 100 percent target for local hire workers to be hired from the Northern Cheyenne Tribe. Consequently, there should be little demand for additional services from local governments due to the workforce at the dam site.

Costs to local governments in the study area could occur due to deterioration and maintenance requirements for county and state roads. In particular, County Road No. 380, Secondary Highway 314, Secondary Highway 338, and I-90 would all be used extensively in hauling materials and aggregate for rehabilitation of the dam.

Costs to state and federal governments would occur from settlement payments related to the Water Rights Compact signed by the State of Montana, the United States Government, and the Northern Cheyenne Tribe. The state's share of project costs is about $21.8 million.

Costs to the federal treasury for the Tongue River Dam rehabilitation project and the settlement of the Northern Cheyenne reserved water rights exceed $56.5 million. This figure includes $21.5 million for the Tribal Development Fund, $31.5 million for the federal share of the dam project, and $3.5 million for fish and wildlife habitat enhancement. The figure does not include revenue lost to the U.S. Treasury, federal costs for environmental compliance and mitigation, federal costs for operation, maintenance, and replacement on the Tongue River Dam, or any costs associated with the Tribe's allocation of Bighorn Reservoir water. State and federal agencies would experience minor fiscal impacts from paying for coal mine and agricultural mitigation.

During construction, Big Horn County would realize additional taxable valuation on construction equipment located at the dam site. Further governmental revenues would be gained from use/fee taxes such as fuel, gaming, and permits. After construction, some taxable valuation could be lost due to irrigated lands being converted to a non-irrigated status.

Taxable valuation related to lands could be lost due to the proposed project and related mitigation activities. Assuming 1,000 to 4,600 acres were lost from assessed lands, Big Horn County (Montana) would have its taxable valuation reduced by less than

0.01 percent. After rehabilitation was completed and water levels restored to the reservoir, increased taxable valuation from irrigation of additional crop and hayland could occur.

During rehabilitation of the dam, DFWP would most likely lose revenues associated with camping and day use of recreational facilities and loss of concessionaire payments at Tongue River State Park. In 1993, DFWP recreational fees from use of the Tongue River Dam facilities totaled $41,228 and concessionaire payments were $1,500.

Based on the foregoing information and assumptions, the short- and long-term impacts on local government sector fiscal conditions are projected to be minor. Short-term impacts to state and federal fiscal conditions would be significant, due to the costs associated with rehabilitation. Long-term fiscal impacts would be potentially beneficial and significant, as the liability associated with dam failure would be lessened. For a further discussion on impacts to economic conditions, **see *Implementation of Fish and Wildlife Habitat Enhancement Features*.**

4.14.2 Effects Unique to Alternative 1

Construction activities would include site work and reclamation, spillway and low level outlet works construction, and would last for about 18 months. Construction employment would peak at 26 employees and would average about 15 employees. Mitigation employment is expected to last about 1 year and include a maximum of four skilled and ten semi-skilled jobs. Impacts of Alternative 1 on employment would be minor in the short term and negligible in the long term. Wages and salaries would total about $1.9 million. Native American earnings are estimated to total $1.5 million over the project period.

4.14.3 Effects Unique to Alternative 2

Under Alternative 2, construction employment would peak at 16 employees and average about 10 to 12 employees for 15 months. Wages and salaries (1992 dollars) would total $1.7 million. Native American earnings are estimated to total $1.3 million over the project period. Impacts of the RCC alternative would be minor in the short term and negligible in the long term.

4.14.4 Effects From Alternative 3

Under the no-action alternative employment and personal income, the agricultural economy, area coal mining, and public sector fiscal conditions in the study area would remain at current levels. Because of the hydraulic and structural deficiencies of the spillway, the dam could fail causing an event that would threaten lives and damage property. DNRC estimated that full economic losses would total between $300 and $500 million (DNRC 1981). Under the dam failure scenario, both short- and long-term impacts to employment and personal income, the agricultural economy, and public sector fiscal conditions would be significant. Short- and long-term impacts to employment and personal income would be significant due to current crop losses from flooding and lost future income due to farms not being able to irrigate.

Impacts of the no-action alternative on employment, personal income, the agricultural economy, and public sector fiscal conditions would be negligible in the short and long terms with the potential to become major and significant under dam failure.

4.14.5 Cumulative Effects

The cumulative effects associated with the Tongue River Dam and TRR would be moderate for employment if the two projects were to be constructed concurrently. TRR Company employment projections total 202 to 395 during construction, for a cumulative total of 223 to 429 employees in the short term. There would be no cumulative long-term impacts. Cumulative short-term earnings would also be moderate within the basin over the short term.

4.15 TRANSPORTATION

4.15.1 Effects Common to the Construction Alternatives

Short-term truck and other motor vehicle traffic would be generated during construction by: 1) the hauling of construction materials and equipment from outside the project area; 2) hauling of aggregate and borrow material from sources in the project area; 3) movement of materials within the construction site; and 4) commuting of laborers and others between the construction site and Ashland, Birney Village, Lame Deer, and Busby, Montana, and Sheridan, Wyoming.

As indicated on **Table 4-8**, the following construction materials and equipment would be transported to the site by one or a combination of the following methods:

- by truck from a location near Sheridan, Wyoming, through Sheridan, Wyoming then via Secondary Highway 338 (S-338), Secondary Highway 314 (S-314), and County Road No. 380;
- by rail to Sheridan, Wyoming then by truck via Secondary Highway 338 (S-338), Secondary Highway 314 (S-314), and County Road No. 380; or
- by rail to sidings at the Decker coal mines then by truck via Secondary Highway 314 (S-314) and County Road No. 380.

Materials obtained and hauled to the dam from within the project area would include:

- surfacing aggregate for improvements to County Road No. 380 (mainly from Site No. 1); and
- concrete aggregate from Site No. 1 for construction of the improvements at the dam (see **Table 4-9**).

4.15.1.1 Local Roads

Figure 3-6 shows the total daily traffic volumes and the total trucks per day that would occur on County Road No. 380 during the peak traffic period. The peak traffic period is expected to occur for about 6 weeks during mid- to late-summer 1997 when the production and placement of concrete would be in full operation. It is assumed, for these projections, that the hauling of surfacing aggregate from Site No. 1 for County Road No. 380 improvements would not occur during this time. Since most riprap quantities are for erosion protection on Secondary Highway 314, little or no riprap would be hauled on County Road No. 380. Total traffic between Site No. 1 and the dam would be about six times existing volumes and truck traffic; about 110 vehicles per day (vpd). This volume of traffic is well within road design capacity.

TABLE 4-8: Materials From Outside Project Area

Material	Quantity	Truck Loads Total/Daily	Train Car Loads Total/Daily
Alternative 1 (labyrinth weir)			
Riprap	91,000 C.Y.	9,100/30	1,800/6
Portland Cement	15,400 Tons	770/25	160/10
Reinforcing Steel	2,300 Tons	115/5	25/5
Other	2,000 Tons	100/2	20/1
Totals, Alt. 1		**9,395/62**	**2,005/22**
Alternative 2 (RCC spillway)			
Riprap	91,000 C.Y.	9,100/30	1,800/6
Portland Cement	12,100 Tons	605/20	120/8
Reinforcing Steel	695 Tons	35/4	7/1
Other	1,400 Tons	70/2	14/1
Totals, Alt. 2		**9,810/56**	**1,941/16**

Source: DNRC 1994.

TABLE 4-9: Materials From Within Project Area

Material	Quantity	Truck Loads Total/Daily
Alternative 1 (labyrinth weir)		
Surfacing Aggregate	19,000 C.Y.	1,900/63
Concrete Aggregate	92,000 Tons	4,600/23
Totals, Alt.1		**6,500/86**
Alternative 2 (RCC spillway)		
Surfacing Aggregate	19,000 C.Y.	1,900/63
Concrete Aggregate	14,000 Tons	700/14
Totals, Alt. 2		**2,600/77**

Source: DNRC 1994.

The increase in construction-related traffic volumes, particularly trucks, when summer recreational traffic is heaviest may cause the potential for conflicts and accidents, and increased wear on the roadway. The wear would be most significant on steep grades, sharp corners, and during times when the roadway was wet or saturated when deep rutting and integration of gravel with subgrade materials may occur.

Excavation for construction of embankments for relocated sections of County Road No. 380 would be required. This, and other related activities, would generate substantial heavy equipment and other traffic on the roadway during roadway construction. Construction activities would temporarily (up to 1.5 years) obstruct access to East Shore Road.

Substantial movement of materials and various other construction operations would occur within the construction site including excavation and embankment materials, mixed concrete, and other materials. Temporary haul roads would be used for this purpose within the staging area.

Twelve areas of County Road No. 380 and small portions of East Shore Road would be inundated by the higher water elevations. Relocation of County Road No. 380 and small parts of the East Shore Road would offset impacts of inundation. Impacts of the construction alternatives on local roads would be moderate in the short term and negligible in the long term.

4.15.1.2 Secondary Highways

Figure 3-7 shows the total daily traffic volumes and the total trucks per day that would occur on area highways during the peak traffic period assuming that rail was not used to transport major construction materials and that a site near Sheridan, Wyoming was found for riprap. This peak would be expected to occur for about 4 to 6 weeks during mid- to late-summer 1997 when the hauling of both riprap and concrete materials (cement and reinforcing steel) are underway. During the remainder of the construction period, about half as much truck traffic would be generated by the construction project on area highways.

Most of the generated truck traffic would use S-314, from County Road No. 380 to the Montana/Wyoming border and S-338 from the border to I-90 and Sheridan. Peak increases in truck traffic would approximately double. There is more than adequate capacity to accommodate these volumes without adversely affecting the existing level-of-service and pavement structure.

There is a total of approximately 2.6 miles along eight different sections of S-314 where increased water levels due to a 100-year flood would be above the toe of the embankment of the existing roadway (Western Water Consultants 1993). None of the existing roadway surface or base course would be impacted. In areas where the higher water elevation would be above the toe of existing roadway embankments, erosion protection would be constructed by installing riprap or vegetative protection from elevation 3,432 feet, down the existing embankment slope to a distance of 12 feet outside the toe of the slope. The riprap would be placed over suitable filter fabric which would be placed on the ground after vegetation was removed.

Impacts of construction alternatives on secondary highways would be minor in the short term and negligible in the long term.

4.15.1.3 Off-road Travel

Off-road travel would not be affected by the proposed construction project except in the immediate area of the construction site or where land is inundated by new water levels. Impacts of construction alternatives on off-road travel would be negligible to minor in the short and long terms.

4.15.1.4 Railroads

Assuming the Decker coal mines' siding was used, the 16 to 22 carloads per day of construction materials that may be generated by the proposed project represent a relatively small percentage of the 400 to 500 carloads of coal per day that are hauled from the mines. Therefore, little impact on the branch line would be expected. After the summer of 1997, an average of six carloads of riprap per day

would be hauled to the project area. It has not been determined at this time if the Decker mines can allow the use of the sidings or if BN Railroad can provide the rail cars needed.

If a rail load-out at Sheridan were used, adequate sidings and other facilities exist there for unloading major construction materials for subsequent haul by truck to the project site. Fifty-six to 62 truck trips per day (**see Table 4-8**) would be required to travel through a three-to-four block residential area in Sheridan to reach major streets and highways. Impacts of this increase in truck traffic may include increased noise levels (**see *Noise***), increased dust, vehicle exhaust and other vehicle-related air pollution emissions, increased wear and damage to the street system, and reduced safety.

Impacts of construction alternatives on use of railroads would be minor in the short term and negligible in the long term. Impacts on Sheridan related to use of railroads (if this option were used) would be moderate in the short term and negligible in the long term.

4.15.2 Effects Unique to Alternative 1

The construction work force would be the largest during mid- to late-summer 1997 for about 1 month. During this time, the estimated workforce would be 26 persons for Alternative 1. These workers and related services would generate approximately 240 vpd (mostly passenger cars and pickups).

A total of 7,500 trucks would use County Road No. 380 during construction of the proposed project, resulting in an increase of 15,000 truck trips (one way loaded and one way empty).

Assuming that most major construction materials would be hauled to the Decker coal mine sidings by rail, Alternative 1 would generate up to 22 rail carloads per day. This peak traffic period would occur for 4 to 6 weeks during mid- to late-summer, 1997 while construction materials were being hauled.

Assuming that most major construction material would be hauled from Sheridan, Wyoming, 62 truck trips per day would be required to travel through three to four blocks of a residential area in Sheridan to reach major streets and highways.

Impacts from Alternative 1 would be moderate in the short term and negligible in the long term.

4.15.3 Effects Unique to Alternative 2

It is projected that the construction work force would be largest (up to 16) during mid- to late-summer 1997 for about 3 months. It is estimated that these workers and related services would generate approximately 200 vpd (mostly passenger cars and pickups).

It is estimated that a total of 2,600 trucks would use County Road No. 380 during construction of the proposed project which would result in an increase of 5,200 truck trips (one way loaded and one way empty).

Assuming that most major construction materials would be hauled to the Decker coal mine sidings by rail, Alternative 2 would generate up to 16 rail car loads per day. This peak traffic period would occur for 4 to 6 weeks during mid- to late-summer, 1997.

Assuming that most major construction material would be hauled from Sheridan, Wyoming, 56 truck trips per day would be required to travel through three to four blocks of a residential area in Sheridan to reach major streets and highways.

Impacts from Alternative 2 would be moderate in the short term and negligible in the long term.

4.15.4 Effects From Alternative 3

Under the no-action alternative, local road and secondary highway configurations would remain the same until a future need arose to change them. Traffic levels would follow growth trends independent of those projected for the project. Off-road travel would continue and railroads would remain under current conditions. Impacts of the no-action alternative on local roads, secondary highways, off-road travel, and railroads would be

negligible in the short and long terms. Failure of Tongue River Dam would inundate and damage many transportation facilities including numerous private and county roads located along the stream valley to Miles City, local streets and roads at Ashland, BN Railroad, and numerous local streets and roads at Miles City (**see Table 4-10**). Dam failure would result in major and significant short- and long-term impacts to transportation facilities.

TABLE 4-10: Transportation Facilities Potentially Affected by Failure of Tongue River Dam

Highway	From Milepost to Milepost	Reference Point
S-566	3.6 - 9.1 18.1 - 22.2 24.4 - 38.5	S-566 crosses the Tongue River at Milepost 31.4
U.S. 212	60.9 - 62.6	U.S. 212 crosses the Tongue River at Milepost 61.4
S-447	45.5 - 52.7	S-447 crosses the Tongue River at Milepost 52.5
S-332	0/1 - 12.5 17.2 - 22.6 27.8 - 29.4 33.0 - 50.2	S-332 crosses the Tongue River at Milepost 39.6
MT 59	6.3 - 9.8 10.5 - 11.7	
I-94	136.9 - 137.9	I-94 crosses the Tongue River at Milepost 137.5
I-94 Business Route, Miles City	1.8 - 2.8	I-94 Business Route crosses the Tongue River at Milepost 2.3
U-8002 (5th Street) in Miles City	N/A	0.4 miles between Washington and Bridge streets
U-8003 (Pleasant Street) in Miles City	N/A	0.1 miles between 5th Street and MT 59
U-8005 (Bridge Street) in Miles City	N/A	0.1 miles between 5th Street and 7th Street

4.15.5 Cumulative Effects

Cumulative traffic effects would occur if the TRR was constructed concurrently with the proposed project. Increased traffic would be most noticeable on roads between the project area and Sheridan due to transport of building materials from the Sheridan area.

The TRR EIS has not identified specific roads or traffic volumes associated with its construction. Also, the actual timing of construction is not known. The railroad would most likely construct the subgrade using on-site materials and then use rail to bring in gravel base course, ties, rails, and bridge components, directly to the railroad bed. The railroad would be incrementally extended from the old and newly built line. TRR company also is planning to use a parallel construction road. County roads and highways connect to this road. County Road No. 380 and Secondary Highway 314 (S-314) could be used by TRR workers concurrently with workers for the Tongue River Dam project, potentially increasing vehicle trips by an unknown amount. Cumulative effects from the TRR project and the Tongue River Dam project on transportation would be minor to moderate in the short term and negligible in the long term.

4.16 RECREATION

4.16.1 Effects Common to the Construction Alternatives

4.16.1.1 Access Restrictions

Tongue River Reservoir serves as a unique recreation resource in the region and would experience short-term impacts during construction. Restricted access during the 2-year construction and reclamation phases of the project would affect recreation, including portions of Tongue River State Park, and the Tongue River Canyon fishing access site and campground below the dam. Park-related recreation from the dam construction site to aggregate Site No. 1 (at Campers Point) would also be affected during construction.

The existing fishing access site would be a parking area for construction personnel. Opportunities for fishing, boat launching, and camping at the access site directly below the dam would be lost due to construction-related activities.

Travel would be restricted from aggregate Site No. 1 (at Campers Point) to the construction staging area. The proposed restriction would limit vehicle access

to some areas along the reservoir. Existing campsites in the Neck and Cormorant Bay areas, as well as the northern shore of the reservoir would be inaccessible by road.

In total, an estimated 71,000 visitor hours would be lost due to the proposed access restrictions from aggregate Site No. 1 (at Campers Point) to the fishing access site below the dam. Displaced recreational opportunities would be redistributed to other areas of the state park, however, because of anticipated reductions in overall visitation to the state park during construction, this redistribution would not result in significant overcrowding of the other areas at Rattlesnake, PeeWee, and Sand Points. Off-road travel on the exposed reservoir margin after drawdown could provide temporary access to the shoreline. Impacts of alternatives 1 and 2 on access to the State Park would be moderate to major in the short term and negligible in the long term.

4.16.1.2 Tongue River State Park

Mining of aggregate Site No. 1 (Campers Point) and construction of planned park improvements would result in major short-term impacts to recreationists who use Tongue River State Park. Aggregate mining at Campers Point would likely begin in September of 1996 and continue for 4 to 5 months through the winter of 1997. Closure of the Campers Point portion of Tongue River State Park to camping would occur after Labor Day weekend during 1996. Closure of Campers Point could continue through 1998 until park improvements are completed. An alternate boat ramp would be available for public use when the ramp at Campers Point is closed. Access to portions of Rattlesnake, PeeWee and Sand Points would be available during the time that Campers Point is closed.

In the long term, improved recreation settings and opportunities at Tongue River State Park during most years would result from excavation of aggregate at Campers Point to a depth of approximately 3,418 feet (range of 3,415 to 3,422 feet) and creation of a shallow-water bay. Planned park improvements would be designed to complement use of the bay (**see Figure 2-12, *Recreation Mitigation and Enhancement Site Plan***). The accessibility of this bay to boats during all summers would be dependent on reservoir pool levels that result from final operating plans developed after construction and the extent of future Tribal water use and Wyoming water development. Interim reservoir operating plans indicate that a bay could be accessible to boats throughout the summer of average and wet years (with no further Wyoming water development), with portions inaccessible during April, August, and September of dry years. See **sections 4.24.1.6 and 4.24.2.6** for effects on recreation at Tongue River State Park from water development scenarios.

Impacts to recreationists who use Tongue River Reservoir would result from the loss of camping opportunities at Campers Point beginning in late summer of 1996 with the initiation of aggregate mining and possibly continuing through 1998 as park improvements are completed. Recreationists could experience dust and noise from mining activities during late summer of 1996, especially when using adjacent park areas that would be available for camping. Recreationists using County Road 380 from north of Sand Point to the staging area below the dam would experience partial road closures, delays and slow travel (**see *Transportation***). Existing campsites in the Neck and Cormorant Bay areas and along the north shore of the reservoir would be inaccessible during road construction, and would be inundated with reservoir refilling following construction.

During typical years, new reservoir water levels would cause only a slight change in recreational opportunities at Tongue River State Park. However, the changes that would occur are mostly related to the size and nature of the areas available for camping (**see *Recreation Experience*** section below for discussion of impacts to the nature of camping experience). Increased water levels would inundate the flats, thereby eliminating those areas as effective campsites. However, because of the relocation of the county road, the acreages available for "rustic" camping would be similar to those currently experienced at the reservoir (**see Table 4-11**). Total area available would increase at Campers and PeeWee points by 5 and 27 acres, respectively. Roughly 13 and 40 acres would be lost at Rattlesnake and Sand Points, respectively, after the new water level was

established. Neck Bay, Cormorant Bay and the North Shore areas would lose approximately 5 acres. The recreation mitigation and enhancement plans call for a restructuring of the state park to include more developed access to camping areas while keeping the rustic nature of the opportunity intact (proposed mitigations to the state park are projected to cost between $350,000 to $450,000 and enhancements $1,000,000 to $1,250,000).

TABLE 4-11: Change in Acreage Available for Camping

Camping Opportunity	Acres From Proposed Water Elevation To New Road	Acres From Normal Elevation (3,420 Feet) To Old Road	Project-related Change in Available Camping Acres
Rattlesnake Point	77	90	-13
Campers Point	86	81	+5
PeeWee Point	71	44	+27
Sand Point	69	109	-40
Neck Bay	39	39	0
North Shore	20	25	-5
Total	**362**	**388**	**-26**

Source: Figures developed by MME Corp. 1994

Recreational facilities at the state park, such as the sand beach at Sand Point, would be replaced, and some relocated such as the boat ramps and picnic shelters at Campers Point, resulting in no net loss of opportunity (**see Figure 2-12**). In other cases, facilities such as the restrooms, campsites, and access for boats would be improved, and others added, such as a fish cleaning station at Campers Point.

The proposed mitigation and enhancement plans would benefit state park users in the long run. Impacts of new higher water levels under alternatives 1 and 2 on the state park would be negligible to minor in the long term. See Sections 4.24.1.6 and 4.24.2.6 for recreation effects under Tribal water use scenarios.

4.16.1.3 Downstream Floating and Fishing

Short-term impacts to downstream floating and fishing include access restrictions discussed earlier in this section. Postconstruction reservoir operations would have a positive impact on downstream floating and fishing opportunities as more consistent flows would be released from the dam (**see Appendix E and Tribal Water Development Scenarios**). Impacts of alternatives 1 and 2 on downstream floating and fishing opportunities would be negligible to minor in the short term and long terms.

4.16.1.4 Recreational Experience

During construction, the recreational experience would be impacted by access restrictions, fluctuating water levels, construction-related noise and dust (particularly related to aggregate mining), and temporary use restrictions at the fishing access site and state park facilities.

The recreational experience would be impacted by new water levels as the new acreage made available for camping would lack the qualities of those lost. Increased water levels would inundate the flats, thereby eliminating those areas as effective campsites and forcing the recreationists onto steeper slopes. In addition, the woody vegetational zone that is used extensively for shade, wind relief, and privacy by recreationists, would be reduced from an average width of 8 feet to an average width of 2 feet because of the steep nature of the "new" shoreline (J. Little, pers. comm., February 11, 1994).

Fluctuating water levels and changes in fish populations and distribution during construction could impact overall boating and fishing experiences of visitors to the reservoir. Noise and dust from construction related activities could impact the recreational experience of visitors to the state park near aggregate Site No. 1 and those recreating near the dam construction area. Losing the use of the fishing access site and campground below the dam would eliminate the opportunity to experience the use of that area in the short-term. Impacts of alternatives 1 and 2 on recreational experiences would be moderate to major in the short term and negligible to minor in the long term.

4.16.1.5 Boating Hazards and Navigational Safety

Construction activities would cause the water levels to fluctuate between elevation 3,390.5 and 3,409 and

3,416 feet under alternatives 1 and 2, respectively. Although construction schedules, drawdown schedules, and refilling elevations differ between the construction alternatives, the character of the impacts would remain the same. The drawdown schedule would expose navigational hazards, make shoreline access and use an inconvenience, disturb camping and picnicking activities, and temporarily interrupt the use of existing docks and boat ramps.

Prior to spring runoff in 1997, a coffer dam would be constructed after which the reservoir could be allowed to store water from spring runoff. Between September and October of that year, water levels would drop to elevation 3,390.5 feet -- effectively limiting boating opportunities for up to 2 months during construction of the cellular coffer dam. Spring runoff in 1998 would be stored up to reservoir elevation 3,409 feet under Alternative 1 or 3,416 feet under Alternative 2 during which boating activities could resume.

Temporarily maintaining the reservoir at low elevations during construction would cause some underwater benches to be exposed or nearly exposed, much like those that appear at Rattlesnake, Campers, and PeeWee points during current low water levels. Submergent benches could expose hazards to boaters in the form of sandbars, submerged trees, and sunken debris. Hazards would not be marked and fluctuating water levels would make it difficult to identify all obstructions. However, notice of hazards related to reservoir drawdowns would be posted at the state park and especially at the boat ramp.

Areas of shallow water, submerged hazards, and poor substrate for anchoring would make use of, and access to, the shoreline an inconvenience. Camping and picnicking facilities on shore could be reached by boat, although latrines, picnic shelters, and developed fire rings would be further up the shoreline. Park managers would continue to allow boaters to use the shore for various recreational activities.

Existing boat ramps and possibly the private boat slips could be used during the construction drawdown period as long as the water levels remained above elevation 3,400 feet, and aggregate mining activities did not preclude this use. Below this point, the concrete boat ramp would not reach the water's edge. Boats would be required to launch directly from shore, causing potential damage to boats, trailers, and towing rigs. Docking would need to be directly on shore, potentially damaging boats, and causing safety concerns for passengers.

During construction of coffer dams in the spring, and the 2-month drawdown period in the fall, an estimated 35,000 boating hours would be lost. This figure represents a loss of opportunity for an estimated 250 to 600 boats during the period.

Upon completion of the project, subsurface obstacles in newly flooded areas could pose navigational hazards for boaters near shore. The outer perimeter of aggregate mining at Campers Point would be more than one thousand feet from shore at full pool elevation. Portions of the perimeter either would be lowered to approximately elevation 3,416 feet to remove a potential subsurface hazard or filled to above full pool elevation. Impacts of alternatives 1 and 2 on boating opportunities and navigational safety would be moderate in the short term and minor to moderate in the long term.

4.16.2 Effects From Alternative 3

Long-term recreational impacts under Alternative 3 include those resulting from drawdown water levels and the potential for total loss of recreational opportunities in the case of dam failure. The drawdown water levels currently experienced on the reservoir would continue under Alternative 3. Boating opportunities would be uncertain and often risky as nearly exposed sandbars, submerged trees, and sunken debris could pose hazards to boaters.

The drawdown water level would continue to provide intermittent beaches for camping and off-road recreation. Large expanses of exposed beaches would continue the available room for recreational activities. Existing facilities listed in **Chapter 3** would remain unchanged for the most part, including the marina at Campers Point.

Long-term impacts to recreation could occur if the dam was not repaired and ultimately failed. Boating, fishing, and other recreational uses would be eliminated. Day use and terrestrial-based recreation could continue without the benefit of the reservoir experience. Impacts of the no-action alternative on recreational use of the State Park would be minor to moderate in the short and long terms with the potential to become major and significant in the event of dam failure.

4.17 LAND USE AND OWNERSHIP

4.17.1 Effects Common to the Construction Alternatives

Land use impacts would be similar under both construction alternatives. About 400 acres would be inundated by the raised water elevation in the reservoir. Between 1,000 and 4,600 acres of private land adjacent to the reservoir could be acquired for reservoir operation (including flood easements to elevation 3,440 feet) and, secondarily for riparian and wildlife mitigation. If easements were not negotiated, this could result in a shift in landownership **(see Figure 3-8)** (from private to public), and have minor secondary effects on agriculture and fiscal conditions.

A small amount of crop and grazing land would be affected by the change in ownership. Since the acreage affected is less than 1.0 percent of total land in the county, and because DNRC could lease the land for agricultural purposes in the future, this impact would be negligible.

Livestock exclusion fencing is proposed as a possible wildlife habitat mitigation on some DNRC lands as part of the project. Although this would curtail trespass livestock use of DNRC lands, causing some loss of grazing to local landowners, it would provide a beneficial impact to recreationists and wildlife in the area. Impacts of construction alternatives on land use and ownership would be minor in both the short and long terms.

4.17.2 Effects From Alternative 3

Under the no-action alternative, landownership adjacent to the reservoir would probably remain in the same general balance of private and public ownership. Livestock trespass on unfenced public lands would be perpetuated, resulting in continued minor inconvenience for recreationists and deterioration of wildlife habitat. Impacts of the no-action alternative on land use and ownership would be negligible in both the short and long terms.

4.17.3 Cumulative Effects

If the Tongue River Railroad was built, it is assumed that agricultural land would be acquired for right-of-way. This would result in a cumulative loss of agricultural land in the Tongue River Basin.

4.18 CULTURAL RESOURCES

4.18.1 Effects Common to the Construction Alternatives

Eight Euro-American and ten Native American cultural resources would be affected by the proposed raising of the water level and associated construction activities **(see Table 4-12)**. Two of the 10 Native American sites have been determined eligible for listing in the National Register of Historic Places (National Register). Two of the six Euro-American sites have been determined eligible for listing in the National Register. Another historic period site, the Lee Homestead, was listed in the National Register in 1981.

The Bureau of Reclamation determined the proposed project would have an "adverse effect" on sites listed in, or eligible for listing in the National Register. The "Determination of Effect" was made in compliance with the National Historic Preservation Act through consultation with the Montana SHPO as required in 36 CFR 800.5. The Northern Cheyenne Tribe and the DNRC concurred with Reclamation's findings.

Mitigation of adverse effects to historic sites would be determined by USBR in consultation with the

SHPO and the Advisory Council on Historic Preservation as required by 36 CFR Part 800. Reclamation will include the DNRC and the Northern Cheyenne Tribe as partners in the consultation process and they will be signatories to any mitigation agreement. The Bureau of Indian Affairs will also be a concurring party because trust lands are involved. The Crow Tribe, Medicine Wheel Coalition, and Bureau of Land Management will participate as "interested persons" as specified in 36 CFR Part 800.2(o). Mitigating measures may include, but are not necessarily limited to, photography, measured architectural drawings, historical research, archeological excavation, interpretation through scientific and popular publications, and museum exhibits, oral histories, and public archeology. Some mitigation may occur on private land. If this occurs, the effected owners will be invited to participate in the consultation process as interested persons.

In some cases it was determined that a particular site had intangible religious importance to the Northern Cheyenne, or the Northern Cheyenne and Crow tribes, but it did not meet the registration requirements as a Traditional Cultural Place eligible for listing in the National Register. In these instances, the concerns of the appropriate tribe(s) for sites with religious associations will be considered under the American Indian Religious Freedom Act. Three of these sites 24BH591, 24BH2317, and 24BH2613 have been determined eligible for listing in the National Register and 24BH2317 and 24BH2613 will be effected by the proposed project. A site determined to be ineligible for listing in the National Register, 24BH2608, will not be affected by the proposed project. Site 24BH2608 is on land transferred from the Bureau of Land Management to the Northern Cheyenne Tribe under the terms of the Settlement Act. The National Register eligibility of sites 24BH2594 and 24BH2595 has not been determined.

4.18.2 Summary of Impacts Common to the Construction Alternatives

Site 24BH591, the stone ring site that may be associated with Two Moons, would not be affected by the proposed action. The bison kill (site 24BH2613) would be adversely effected by further inundation. This site has been determined to be eligible to the National Register due to its traditional cultural significance (Criterion A)[1] and its informational value (Criterion D). Mitigation of effects to site 24BH2613 would be determined by USBR in consultation with the appropriate parties. The Northern Cheyenne and Crow have specifically requested that they be included in any discussion of treatment of site 24BH2613 (Peterson, Ibanez, and Brownell 1995).

Site 24BH2317, a stone ring site with a heavy concentration of a relatively rare lithic type, has been determined to be eligible to the National Register for its informational value (Criterion D). This site would be partially inundated and would see increasing disturbance by recreational users of the reservoir. Mitigation of effects to site 24BH2317 would be determined by USBR in consultation with the appropriate parties. The Northern Cheyenne and Crow have specifically requested that they be included in any discussion of treatment of site 24BH2317 (Peterson, Ibanez, and Brownell 1995).

The impacts to sites 25BH2594 and 25BH2595 are unknown at this time. Maps of the currently proposed road alignments indicate they may be closer to the road right of way than previously thought. A field inspection of the sites under snow-free conditions is required to determine if the sites are within the proposed right-of-way. If the sites appear threatened, then National Register eligibility and impacts will be determined.

Two historic sites that would be adversely affected by the project have been determined to be eligible for listing in the National Register. One is the Shreve Homestead (site 24BH2271) and the other is the Tongue River Dam (site 24BH2589). The Shreve Homestead, determined eligible for listing in the National Register under Criteria A, C, and D, would be damaged or destroyed by inundation.

[1] According to CFR, Title 36, Part 60, an historic property can be nominated to the NRHP if it is associated with events that have made a significant contribution to the broad patterns of our history (Criterion A); or is associated with the lives of persons significant in our past (Criterion B); or it embodies the distinctive characteristics of a type, period, or method of construction, or it represents the work of a master, or it possesses high artistic values, or it represents a significant and distinguishable entity whose components may lack individual distinction (Criterion C); or it has yielded, or may be likely to yield, information important in prehistory or history (Criterion D).

Archeological deposits would suffer physical and chemical impacts and the standing structures would rapidly deteriorate. The original appearance and structure of the Tongue River Dam, eligible under Criterion A, would be altered by the proposed construction activities although it would continue its historical flood control and irrigation functions.

The values that qualify the Lee Homestead (site 24BH2349) for the National Register would not be affected by the proposed dam construction. Construction of Tongue River Dam in 1938 completely altered the original setting of the homestead and would have destroyed associated structures and archeological deposits. The cluster of relatively intact buildings would be protected during construction by fencing and contract requirements.

4.18.3 Effects From Alternative 3

If Tongue River Dam failed, there would be a significant but unknown number of effects to cultural resources. The remaining buildings and structures comprising the National Register-listed Lee Homestead would be destroyed. The dam, recommended for listing on the National Register, would be significantly altered and would cease its historical flood control and irrigation functions. An unknown number of sites downstream, north of the dam, would be affected by water-caused erosion due to unregulated flows of the Tongue River. Upstream, a number of historic and prehistoric sites (currently under water) would be exposed. The draining of the reservoir could expose mud flats to wind erosion, leading to site compaction and loss of stratigraphic integrity (loss of soil layers). The number of sites that would be affected is unknown because no cultural resources inventory was done prior to flooding of the original reservoir.

Impacts of the no-action alternative on cultural resources would be negligible in the short and long terms with potential to become major and significant under dam failure.

TABLE 4-12: Cultural Resources Affected by the Proposed Raise in Water Levels and Associated Construction Activities*

Site #	Type	Land Owner	Impact	NR Determination
Historic Sites				
24BH0604	Farmstead	DNRC	Inundation	IE
24BH1553	Road	County	Realignment & upgrading	IE
24BH2271	Farmstead	DNRC	Inundation	E - A, C, D
24BH2349	Farmstead	DNRC	Dam	Listed
24BH2589	Dam	DNRC	Dam	E - A
24BH2616	Farmstead	DNRC	Inundation	IE
24BH2670	Railroad Grade	DNRC	Inundation	IE
24BH2720	Farmstead	DNRC	Inundation	IE
Prehistoric Sites				
24BH0605	Lithic Scatter	Decker Coal & DNRC	Inundation	IE
24BH0606	Lithic Scatter	DNRC	Inundation	IE
24BH1064	Lithic Scatter	Private	Inundation	IE
24BH1979	Lithic Scatter	DNRC	Inundation	IE
24BH2316	Lithic Scatter	DNRC	Inundation	IE
24BH2317	Stone Circle	Decker Coal & DNRC	Inundation	E - D
24BH2585	Lithic Scatter	DNRC	Inundation	IE
24BH2592	Lithic Scatter	Private	Road	IE
24BH2594	Other Stone Feature	DNRC	Road (Impact Undetermined)	EQ
24BH2595	Other Stone Feature	DNRC	Road (Impact Undetermined)	UNK
24BH2610	Lithic Procurement	DNRC	Inundation	IE
24BH2613	Bone Processing	Private	Inundation	E - A, D

KEY: A = Eligible under Criterion A
B = Eligible under Criterion B
C = Eligible under Criterion C
D = Eligible under Criterion D
** as defined by DNRC (1992, 1994)*
E = Eligible for nomination to the NR
EQ = Eligibility in Question and to be determined
IE = Ineligible
NR Recommendation = National Register Eligibility Recommendation
UNK = No eligibility Recommendation

4.19
NOISE

4.19.1 Effects Common to the Construction Alternatives

Applicable noise regulations and guidelines provide a basis for evaluating project-related noise impacts. For example, for federally funded highway projects, traffic noise impacts are considered to occur when predicted hourly equivalent sound levels (Leq[h]) approach or exceed noise abatement criteria as established by the Federal Highway Administration (FHWA) or substantially exceed existing noise levels (23 CFR 772). Although "substantially exceed" is not defined, FHWA considers an increase of 10 A-weighted decibels (dBA) or greater to be a substantial increase and thus an impact. The FHWA noise abatement criterion for residences, parks, schools, churches, and similar areas is 67 dBA. FHWA considers a noise impact to occur if predicted Leq(h) noise levels approach within 1 dBA of noise abatement criteria.

4.19.1.1 Roads and Highways

Leq(h) traffic noise levels during construction of the proposed project at several locations on area highways have been estimated and are shown on **Table 4-13.** Predicted noise emissions from free-flowing traffic at constant speeds depend on the number of automobiles and trucks per hour, vehicular speed, and reference noise emission levels of an individual vehicle. Noises from the peak periods during construction of relocated portions of County Road No. 380 would be transitory along the right-of-way, ranging from 65 to 85 dBA at 300 feet.

Noise impacts would occur along Secondary Highway 314 (S-314) in the community of Decker during construction. Based on FHWA guidelines, noise abatement would not be necessary at the U.S. Post Office or any other buildings because they are more than 50 feet from the roadway and therefore would experience noise levels less than the 67 dBA FHWA threshold.

Noise impacts would also occur along County Road No. 380 from S-314 to the dam site because, for distances at least 200 feet from the roadway, existing noise levels would be exceeded by 10 dBA or more. These impacts would occur for a period of 1 to 2 months during the late summer/fall of 1996 during the heaviest period of transportation of most construction materials. During most of the remainder of the construction project, noise levels are expected to be less and would exceed existing levels by less than 10 dBA. Impacts of construction alternatives on road and highway noise would be minor in the short term and negligible in the long term.

4.19.1.2 Construction Staging Area

During major construction operations at the dam site, noise levels are expected to range from 75 to 95 dBA and should drop to 55 to 75 dBA 1,000 feet from the site and 45 to 65 dBA 0.5 mile from the site. There are no residences, campgrounds or other sensitive noise receptors in the area that would be affected during construction -- the fishing access site north of the dam would be closed during construction since it would be used as a staging area. Isolated boaters, fishermen, hikers, campers, and other recreationists within 0.5 mile of the construction site may be adversely impacted during construction. These impacts would be of short duration during one summer.

After completion of the construction project, noise levels at the dam site would return to existing levels.

TABLE 4-13: Noise Levels (in dBA) on Roadways During Construction

Roadway	Location	Distance From Centerline *(feet)* 50	100	150	200
S-314	Decker	67(65)[1]	64(62)	62(60)	61(59)
S-314	South of Road 380	63(59)	60(56)	58(54)	57(53)
Road 380	Between S-314& Site 1	57(47)	54(44)	53(42)	51(41)
Road 380	Between Site 1 & Dam	59(45)	56(42)	54(41)	53(39)

1) Existing noise levels without construction are shown in parentheses.

Since noise impacts at and near the construction site would be short term only and there would be no sensitive noise receptors in the area other than dispersed recreationists, no mitigation measures are proposed. Impacts of construction alternatives on construction staging area noise would be minor in the short term and negligible in the long term.

4.19.1.3 Tongue River State Park

Noise impacts would occur along County Road No. 380 from S-314 to the dam site from transportation of construction materials. Tongue River State Park is adjacent to this reach of the road. At distances of 200 feet from the roadway, existing noise levels would increase by 10 dBA or more. These impacts would occur for a 1-to-2-month period during late summer/fall of 1996. During most of the remainder of construction, noise levels would be less and would raise existing levels by less than 10 dBA. Impacts of construction alternatives on Tongue River State Park noise would be minor in the short term and negligible in the long term.

4.19.1.4 Sheridan, Wyoming

In Sheridan, a three-to-four block residential area would experience noise level increases due to increased truck traffic if materials were hauled to the rail yard and then trucked to the project site. It is estimated that in this area noise levels would increase by approximately 7 dBA and would be 62 to 67 dBA. If this rail option were used, noise impacts of construction alternatives on Sheridan, Wyoming, would be moderate in the short term and negligible in the long term.

4.19.1.5 Decker, Montana

Table 4-11 shows noise levels that would occur at different distances from the centerline of Secondary Highway 314 in the community of Decker. Please note that noise levels are currently relatively high in Decker due to mining activities and related trucking. Based on FHWA guidelines, noise abatement criteria would not be necessary at the U.S. Post Office or any other buildings because they are greater than 50 feet from the roadway. Noise impacts of construction alternatives on Decker, Montana, would be minor in the short term and negligible in the long term.

4.19.2 Effects From Alternative 3

Under the no-action alternative, noise in the study area would remain at current levels.

4.20 VISUAL RESOURCES

4.20.1 Effects Common to the Construction Alternatives

Short-term direct impacts would occur to visual resources in general, and indirectly to recreationists at Tongue River State Park, from changes in appearance of the dam and spillway, county road relocation and cuts-and-fills, placement of riprap or vegetative embankment protection, construction staging area disturbance, and elevation of the shoreline.

These moderate short-term impacts would be most noticeable to recreationists who would perceive not only changes in the status quo, but who would also be impacted by relocation of recreation facilities and temporary loss of vegetation from new water elevations.

Long-term impacts to visual resources would result from the same sources but would be negligible as the shoreline, riparian vegetation, and new park facilities were reestablished. In the long term, views from the water and the shoreline would return to near-existing visual conditions.

4.20.2 Effects Unique to Alternative 1

Under Alternative 1, the labyrinth spillway would look similar to the existing spillway except for the zigzag crest. Impacts on visual resources from the labyrinth weir appearance would be negligible in the short and long terms.

4.20.3 Effects Unique to Alternative 2

Under Alternative 2, the primary concrete chute spillway would look similar to the existing spillway. The RCC secondary and emergency spillways would modify the profile of the existing (historic) dam crest (it would be lowered by 13 feet) and the downstream dam face and toe would be capped by RCC. Impacts on visual resources from the primary spillway would be negligible in the short and long terms. Impacts on visual resources from the RCC secondary and emergency spillway profile would be minor in the short and long terms.

4.20.4 Effects From Alternative 3

Under the no-action alternative, visual resources would remain much the same as existing conditions unless a dam failure occurred. Under that scenario, significant visual impacts would occur from large increases in exposed shoreline, loss of the reservoir pool, and dramatic erosion downstream of the reservoir in the Tongue River Valley. The dam structure itself would be dramatically altered, and could become a visual attraction if breached. Impacts on visual resources from the no-action alternative would be negligible in the short and long terms with the potential to become major and significant under dam failure.

4.21 PROJECT EFFECTS THAT CANNOT BE AVOIDED

Despite the proposed mitigation and monitoring activities described in **Section 2.3.9** of the EIS, the following effects cannot be avoided.

4.21.1 Air Quality

There would be minor and short-term impacts to air quality from construction activities, and from wind erosion of exposed mud flats during and after construction.

4.21.2 Soils

Potential erosion of the new shoreline (as described in **Section 4.6.1.1**) would be unavoidable.

4.21.3 Hydrology

Increases in peak flood discharges under Alternative 1 would be unavoidable.

4.21.4 Wetlands

Loss of narrow bands of wetland on portions of reservoir shoreline would be unavoidable with proposed reservoir operations. These wetlands are pioneer plant communities, dominated by one or two species adapted to growth in disturbed habitats. However, because of this tendency, some of the lost wetland acreage will regenerate naturally once new reservoir levels are established.

4.21.5 Aquatics/Fisheries

There would be unavoidable impacts to the reservoir fishery associated with the necessary drawdown of the reservoir to 9,000 af, like the loss of reproductive and protective habitat, increased water temperatures, and increased predation.

Short term impacts to reservoir and downstream water quality due to increased turbidity during construction would have minor effects on aquatics/ fisheries.

4.21.6 Wildlife

Unavoidable indirect impacts would occur to a number of terrestrial and avian species due to changes in wildlife habitat and nest sites.

4.21.7 Vegetation

Plant communities along portions of the reservoir shoreline would be lost due to inundation. Small

amounts of upland vegetation would also be lost from wave action and subsequent shoreline erosion at the upper elevations of reservoir pool.

4.21.8 Biodiversity

Plant communities along portions of the reservoir margin would be unavoidably lost but this loss would have negligible effects on local and regional biological diversity. Plant species comprising communities that would be lost are abundant and present at many sites within and near the project area. Loss of wildlife habitat affected by the project would have negligible impacts on local or regional wildlife populations.

4.21.9 Economic Conditions

Fiscal impacts to federal and state agencies responsible for Settlement Act payments, mitigation, and dam repair would be unavoidable. Short-term losses of revenue from decreases in camping and fishing would occur to DFWP and local concessionaires.

4.21.10 Transportation

Access to the east side of the reservoir would be temporarily restricted as would access near the construction staging area. Traffic volumes in the vicinity of the construction staging area would increase substantially during construction.

4.21.11 Recreation

Restriction and temporary disruption of certain activities, such as boat launching, would occur both on the reservoir and downstream such as at the fishing access site.

4.21.12 Land Use and Ownership

A minor amount of agricultural land would be lost to agricultural production from inundation. About 75 acres of land would be committed to road and road right-of-way use for relocation and construction of County Road No. 380 and East Shore Road.

4.21.13 Cultural Resources

The inundation of sites 24BH2317 (ring site), 24BH2613 (bison kill), and 24BH2271 (farmstead) cannot be avoided if the reservoir water levels are raised 4 feet. Effects to the dam likewise cannot be avoided.

4.21.14 Noise

Noise impacts would occur in areas within 200 feet of County Road No. 380 and within 0.5 mile of the construction site during a 1-to-2-month period in the late summer/fall of 1996. High truck volumes would occur due to hauling of materials to the dam site. When construction was complete, noise levels would return to existing levels.

4.21.15 Visual Resources

If the RCC alternative was selected, the crest of the existing dam would be lowered by 13 feet, and the downstream face capped by RCC. Temporary visual impacts around the reservoir margin from loss of vegetation due to inundation would be unavoidable.

4.22 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

4.22.1 Geology

Aggregate used for project alternatives would be irreversibly and irretrievably committed to the beneficial use of dam repair and road improvements.

4.22.2 Soils

Relocation of the State Park, shoreline erosion, and road relocations and associated facilities would

require the commitment of land and underlying soils to other uses for the life of the project. Soils underlying the land would be irreversibly committed and in some cases irretrievably lost to these uses.

4.22.3 Wetlands

Inundation and loss of wetlands with the construction alternatives would be an irreversible, minor commitment of site-specific resources. Wetland enhancement and mitigation would offset this loss on a regional basis.

4.22.4 Aquatics/Fisheries

About 1 mile of river upstream of the reservoir would be converted to reservoir pool for the life of the project.

4.22.5 Wildlife

As discussed in the vegetation section, long-term changes in vegetation would result in related responses from wildlife (e.g., as habitat increased or decreased, animal use would increase or decrease). However, conversion of upland grasslands and shrublands to long-lived, pioneer riparian plant communities would contribute to a greater diversity of terrestrial wildlife in the area than would be present otherwise. Such conditions would exist while the reservoir was in place.

4.22.6 Vegetation

The loss of upland grasslands and shrublands due to road and park facility construction would be irreversible. Loss of the narrow band of riparian vegetation around the reservoir that would be inundated with the construction alternatives would be a minor but irreversible commitment of resources; however, failure or removal of the dam would allow riparian plant communities to gradually revert back to upland grass and shrub communities. Eventually, (probably 50-100 years after lowering of water levels) plant communities similar in productivity and species diversity to existing native upland communities would reestablish.

Conversion of riparian plant communities to upland communities with removal or failure of the dam would likely be impeded if noxious weeds became established during the succession from wet to dry conditions. Establishment of noxious weeds could prevent a diverse and productive cover of vegetation on previously flooded shoreline for an unknown period of time. If noxious weeds were to become established, in the absence of control, they could form long-lived communities that could persist for hundreds of years. These long-lived disturbance-caused communities may represent an irretrievable commitment of vegetation resources.

4.22.7 Biodiversity

Biological diversity would be incrementally and irretrievably lost with construction of roads and campground facilities. Wildlife species would experience habitat losses from direct removal of plant communities and indirect habitat loss from displacement from high levels of human activity associated with recreation.

4.22.8 Cultural Resources

In terms of cultural resources, the only known bison kill (site 24BH2613) from the project area could be destroyed. As noted, the informational value of the site can be retrieved by data recovery through excavation. The traditional cultural values associated with the site probably can only be partially mitigated. To the extent that removal of site materials, caused either by water action or archaeological excavation, limits the Northern Cheyenne's ability to renew their cultural ties with the area, criterion A (contribution to broad pattern of history) values would be irretrievably and irreversibly lost. This may be mitigated by the Northern Cheyenne's continuing access to the bluff above the site which would not be inundated and, for some, by the historical information retrieved from the site.

4.22.9 Visual Resources

The project would irretrievably commit the appearance of the dam to something different than it is today; more noticeably under Alternative 2 than Alternative 1 because of the lowered dam crest and RCC cap on the downstream face.

4.23
SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

4.23.1 Wetlands

The construction alternatives would result in the local, long-term loss of wetlands that have developed on the reservoir shoreline. Lost or degraded functions and values of these wetlands would be compensated by natural regeneration of wetlands with the establishment of new reservoir levels, enhancement of existing poor-quality wetlands and construction of new wetlands; therefore, there would be no net loss of wetland productivity on a regional basis.

Dam failure would result in the long-term loss of wetlands that have become established on the reservoir margin. This loss would be temporary because new wetlands would form along the stream channel that would flow through the drained reservoir.

4.23.2 Wildlife

Impacts to terrestrial wildlife would be tied closely to the vegetational changes occurring as a result of the increased reservoir water levels. Species dependent upon viable riparian habitat would be displaced in the short term. Birds would have more options in seeking unoccupied habitats. Long-term impacts would be negligible in that similar habitats to those present can be expected to develop, and in turn, be occupied by species of animals similar to those currently in the area.

4.23.3 Vegetation

Implementation of alternatives 1 and 2 would kill inundated riparian plant communities and convert small acreages of upland plant communities on the reservoir margins to pioneer riparian communities. Pioneer communities are generally low in species and habitat diversity. Riparian plant communities, that would become established after implementation of the proposed action, would produce more biomass than would existing upland communities that they replaced. However, they would have lower levels of species diversity with relatively little understory.

Currently, most upland sites have high grazing potential for livestock and provide habitat for wildlife adapted to shrub/grassland habitats. Conversion to riparian vegetation would reduce grazing values for livestock and alter habitat values for wildlife. The conversion of upland to pioneer, riparian plant communities would elicit long-term (i.e., for the life of the dam) changes in productivity, species diversity, and potential use for grazing and wildlife habitat.

Loss of native upland plant communities with the construction alternatives (e.g. road and park facility construction) would be a long-term loss of this area for livestock and wildlife use.

4.23.4 Biodiversity

Long-term, minor losses in vegetative productivity would result from construction of new roads and campground facilities. Portions of native plant communities would be converted to nonvegetated land uses. Disturbance from construction activities would increase potential for establishment and proliferation of noxious weeds; a long-term loss in productivity of livestock forage and wildlife habitat in the absence of control measures.

Dam failure would result in loss of reservoir contents and fish populations. Because most of the fish species in the reservoir also are present in the Tongue River, there would be negligible impact on species diversity although total fish numbers and fish production would decline. Loss of high levels of fish production in the Tongue River Reservoir with dam failure would be a long-term loss.

4.24 FULFILLMENT OF SETTLEMENT ACT WATER RIGHTS IN THE TONGUE RIVER BASIN

According to the provisions of the Settlement Act, the Tribe, State of Montana, federal government, U.S. Congress, and President of the United States agreed formally that the Tribe is free to use its Compact water for any purpose it chooses. Furthermore, the Tribe is free to change its use of Compact water as it wishes and at any time. The Tribe has identified its present and reasonably foreseeable future use of Compact water as fish, wildlife, and recreation purposes in the reservoir and downstream. A programmatic evaluation of potential impacts of this use is included in **Section 4.24.2** of this final EIS (under the ***Tribal Instream Flow Development Water-Use Scenario***).

Another reasonably foreseeable future use of the Tribe's Compact water, although not formally proposed, would be irrigation of up to 4,911 acres of land on the Northern Cheyenne reservation. Because of this possibility, a programmatic evaluation of potential impacts from irrigation also is included in this final EIS (**see Section 4.24.1**). As provided for in the Settlement Act, use of the Tribe's Compact water must be adopted in accordance with the Tribal Water Code and must receive site-specific environmental review before it can be formally implemented.

To illustrate the general types of impacts that would result from the use of Tribal water for irrigation (a future possibility) and/or maintaining instream flows (the Tribe's identified present and reasonably foreseeable Compact water use), two scenarios were developed and modeled via the Tongue River Water Model. These scenarios are in addition to the two presented in the draft EIS. A discussion of each scenario, and the resultant impacts, follows.

4.24.1 Tribal Irrigation Development Scenario with Instream Releases

This scenario assumes that the Tribe would use a portion of its reserved water rights for irrigation and the rest for instream flows. Under this scenario, about 4,900 acres of land on the Northern Cheyenne Reservation would be irrigated (**see Figure 4-13**). These acres and their potential for irrigation were identified and evaluated as part of an ongoing study being performed on behalf of the Tribe (MSE-HKM 1996). The water requirements for this development would be about 18,200 afy. This assumes a crop irrigation requirement of 22.2 inches of water per year, and an irrigation efficiency of 50 percent. The remaining portion of the Tribe's water rights would be used for instream flows. Releases would be made in the spring for sauger and sturgeon spawning, and during other times of the year to maintain a minimum flow at Miles City. But these instream releases would be made only when reservoir contents are above 20,000 af.

4.24.1.1 Hydrology

Under this scenario, peak flows below the dam and at Miles City will occur during April and May, when water is released for fish spawning. Under existing conditions, peak flows in the Tongue River coincide with the peak runoff during May and June. During the rest of the year, flows below the dam and at Miles City would be similar to historic conditions (**figures 4-15 and 4-16** and **Appendix E**), except at Miles City during the summer when flows would be lower.

Reservoir elevations under this scenario would generally be higher than historic (**Figure 4-17** and **Appendix E**). Water would be released from storage during the early spring for fish spawning in the Tongue River downstream causing the reservoir level to drop. Sufficient water would not be available before the end of runoff to refill the reservoir during dry years.

4.24.1.2 Vegetation

Vegetation along both sides of the Tongue River riparian corridor from the southern to northern boundaries of the Northern Cheyenne Indian Reservation was mapped using color infrared aerial photographs taken in July, 1994. Aerial photographs had a scale of 1-inch equals 1,666 feet. Six vegetation/ land use types were used to classify the area

including dry cropland, irrigated cropland, grassland, hardwood forest, water, and residential areas. **Figure 4-14** shows the distribution of these vegetation/land use types and **Table 4-14** indicates the acreage in each category.

To determine which vegetation types would be affected most by the irrigation development scenario, a geographic information system was used to overlay maps of proposed irrigation projects on the vegetation/land use maps. Likely irrigation project locations (**Figure 4-13**) were obtained from maps supplied by the Tribe and information on file with DNRC. The acreage of each vegetation class that would be occupied by irrigation projects was then calculated. Results of this analysis are indicated in **Table 4-14**.

TABLE 4-14: Vegetation types along a portion of the Tongue River affected by irrigation development under the irrigation development scenario.

Vegetation Class	Existing Acreage	Acreage affected under the irrigation development scenario
Cropland	5,874	2,421
Irrigated cropland	631	150
Grassland	2,159	425
Hardwood forest	2,584	109
Water	841	28
Residential	301	0

Inspection of air photos revealed that in areas where irrigation projects were proposed outside the riparian corridor (1,898 acres) nearly all vegetation fell into the grasslands category.

4.24.1.3 Wildlife

Impacts to wildlife habitat include long-term alteration of vegetative cover within the riparian zone along the Tongue River and in nearby upland areas. Within the riparian zone the wildlife habitats most altered by irrigation projects include grasslands and hardwood forest (**see Figure 4-14**). The reach of the Tongue River bordered by the Northern Cheyenne Indian Reservation includes about 2,584 acres of riparian hardwood forest and 2,159 acres of riparian grasslands. Of the 2,584 acres of riparian forest habitat, about 109 acres would be converted to irrigated cropland. Of 2,159 acres of riparian grassland habitat, about 425 acres would be converted to irrigated cropland. In addition to the riparian grassland habitat, roughly 1,900 acres of grasslands would be converted to irrigated crops in upland areas further away from the river. Wildlife most affected by this conversion would be bird species which require woody habitat for breeding and nesting and upland game species using the grassland areas. The amount of hiding cover for deer that would be removed would be relatively small and cultivation of irrigated crops on approximately 2,400 acres currently used for dryland crops may partially offset the loss of deer forage in the grassland habitat type.

Birds also could be adversely affected by collision with power lines to electrically driven pumps though this impact could be reduced with proper marking of the lines. Raptors could be electrocuted when perching on improperly designed power line poles.

No currently occupied bald eagle nests would be affected by additional irrigation on the Northern Cheyenne Reservation.

4.24.1.4 Fisheries

The irrigation development scenario would affect aquatic habitat by altering reservoir levels and downstream flow rates. Fish also could be killed in diversion canals and pumps. Construction of irrigation diversions also could increase turbidity and sediment over the short-term and adversely affect aquatic habitat. In general, under this scenario, reservoir levels would be significantly higher than under most current conditions as shown in **Figure 4-17** and **Appendix E**. These higher levels would increase reservoir surface area and benefit reservoir fisheries by leading to a more productive aquatic environment.

Table 4-15 shows the amount of instream flow needed to maintain aquatic habitat in four reaches of the Tongue River below the dam. These amounts were determined by the Department of Fish Wildlife and Parks fisheries personnel and were based on field studies (Montana Fish and Game Commission 1976). **Table 4-15** also indicates how frequently these

POTENTIAL IRRIGATION

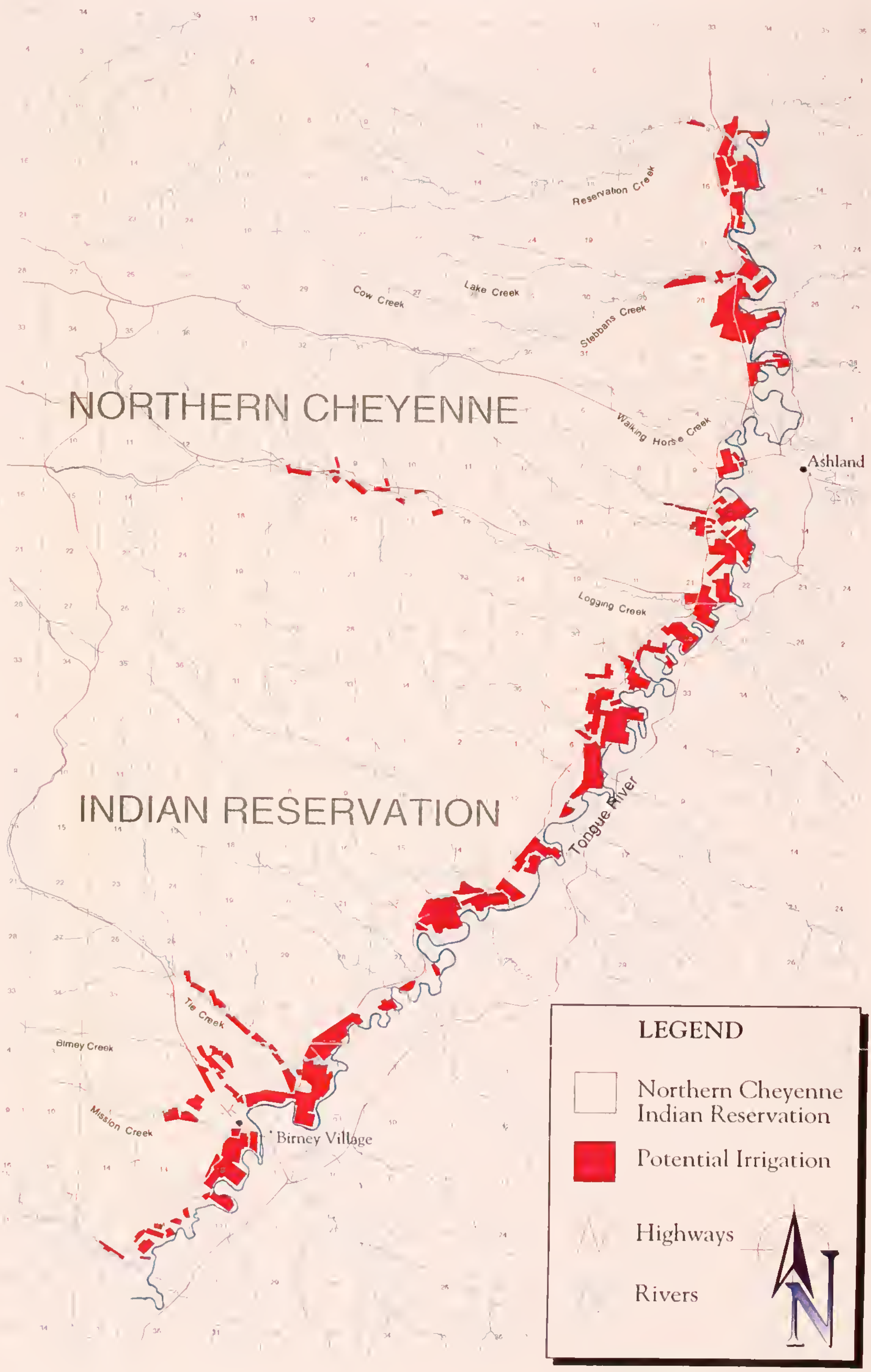


Figure 4-13. Potential Irrigation

TONGUE RIVER LAND USE

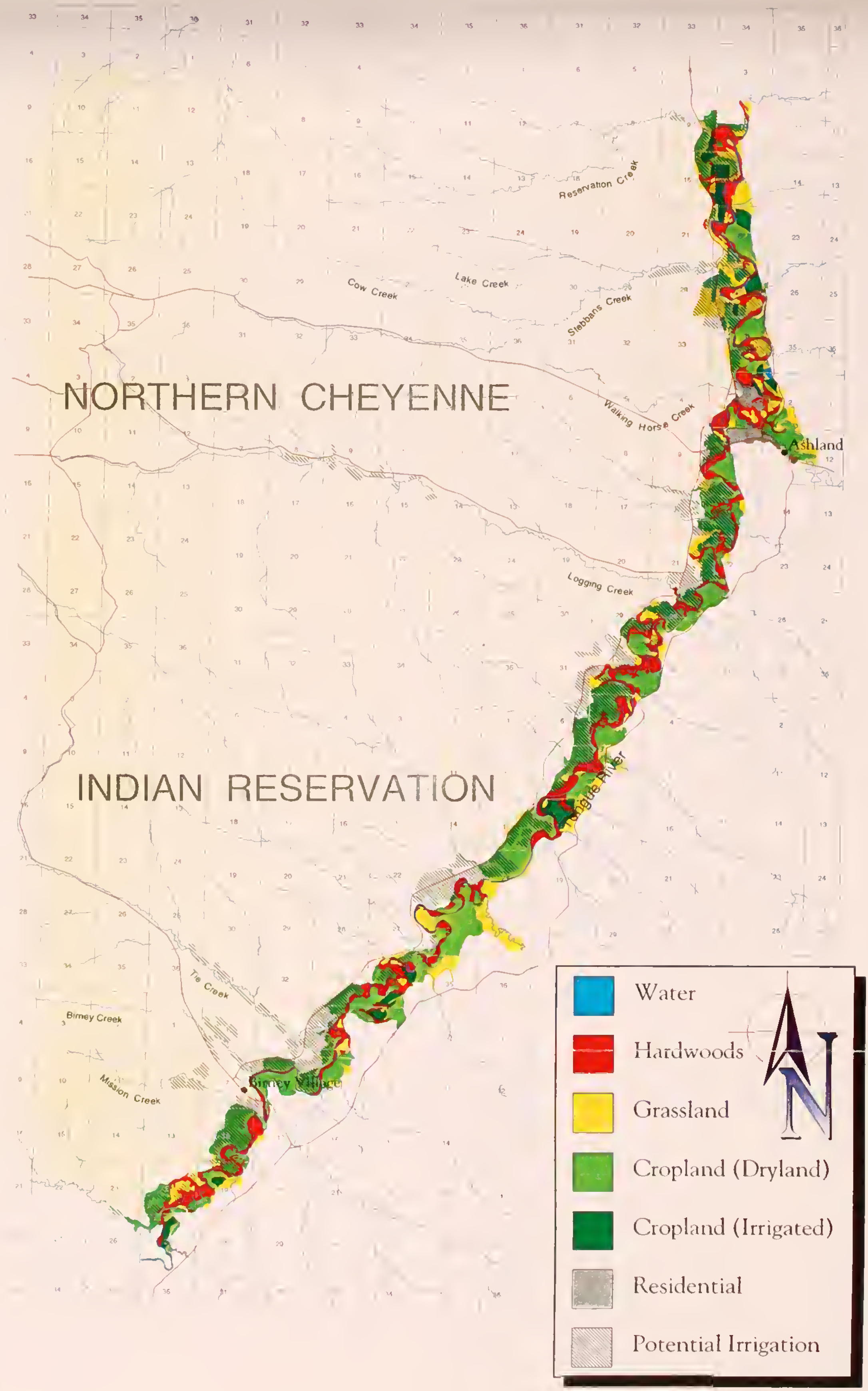
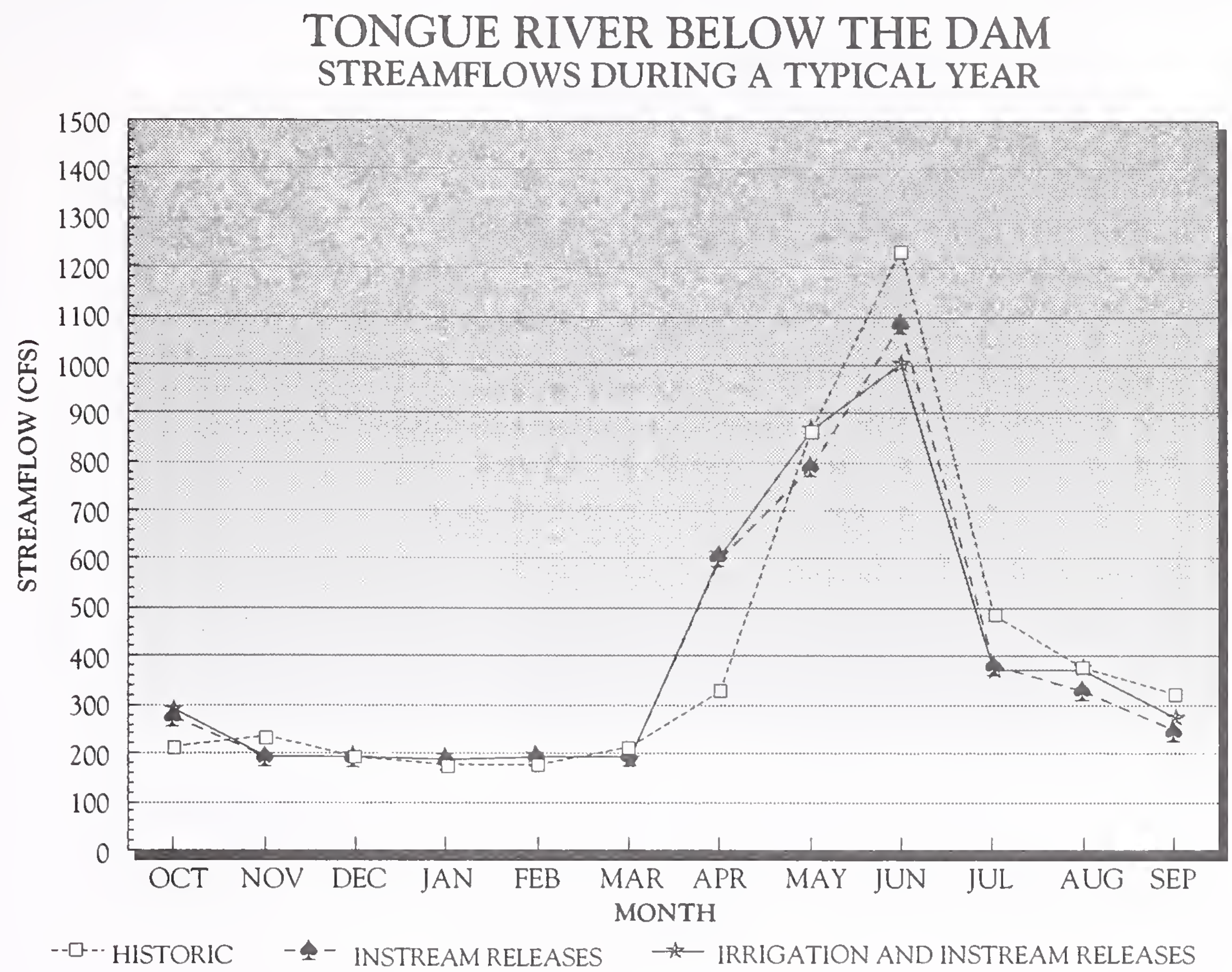


Figure 4-14. Tongue River Land Use



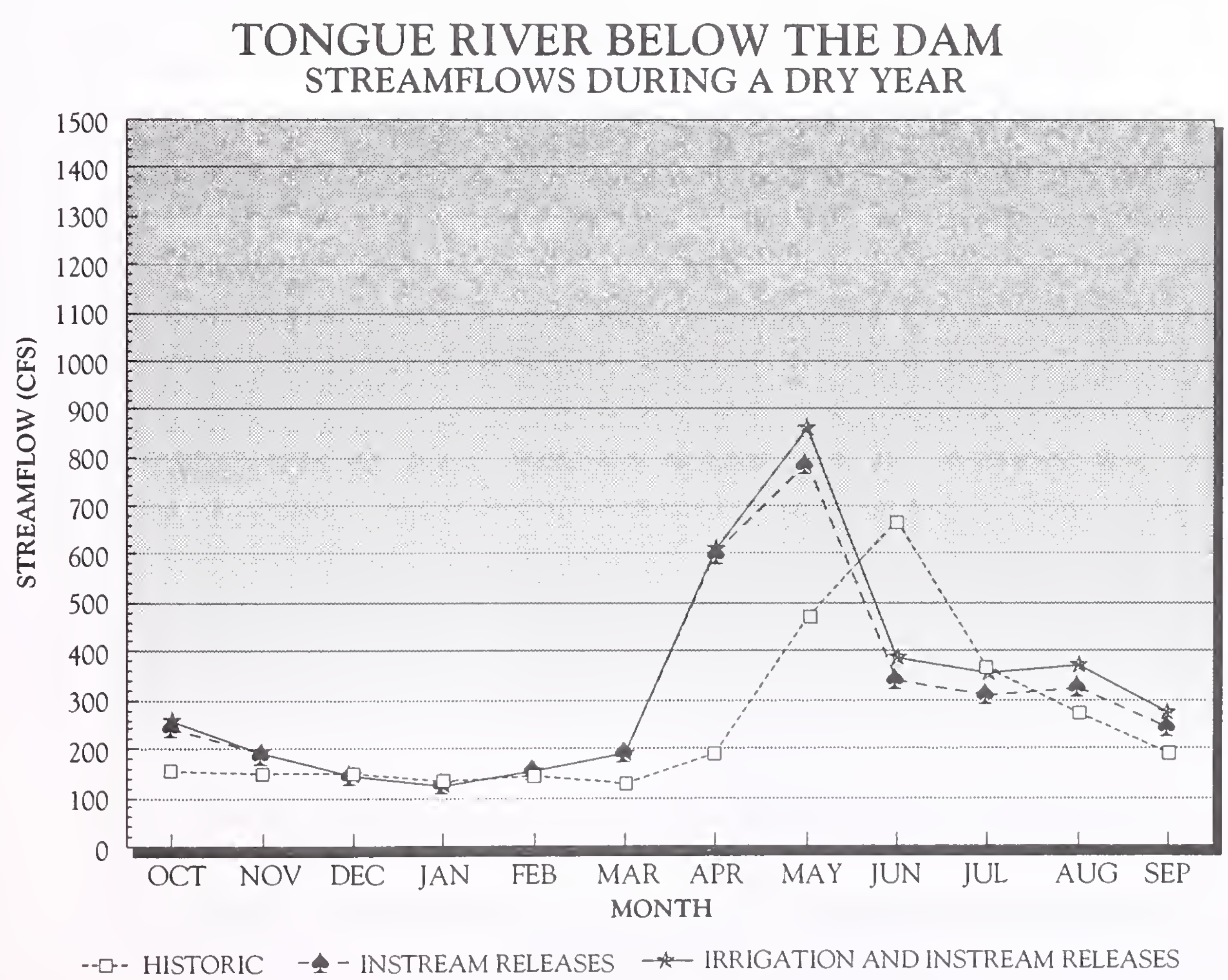
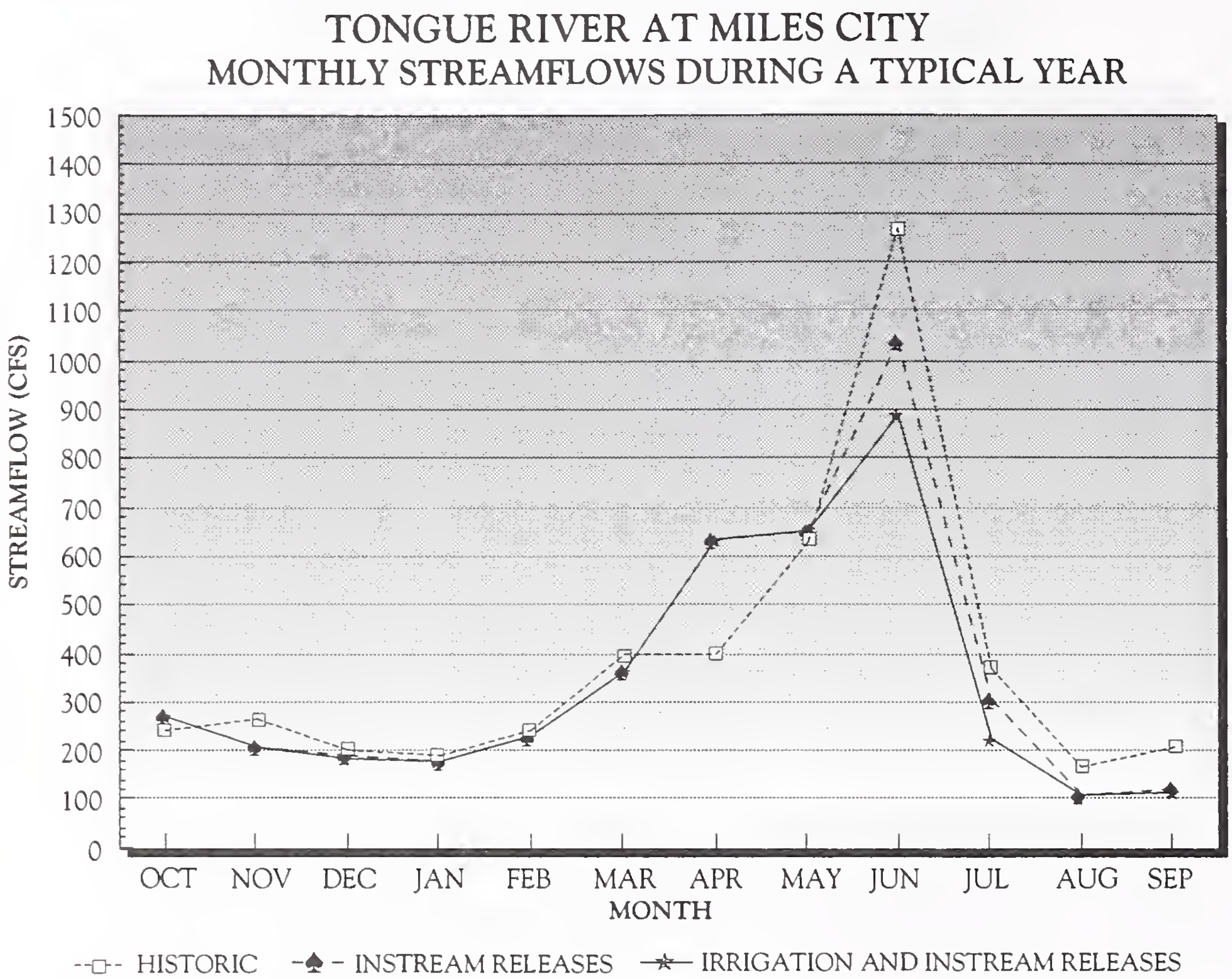


Figure 4-15. Tongue River Flows Below The Dam With Potential Tribal Water Development



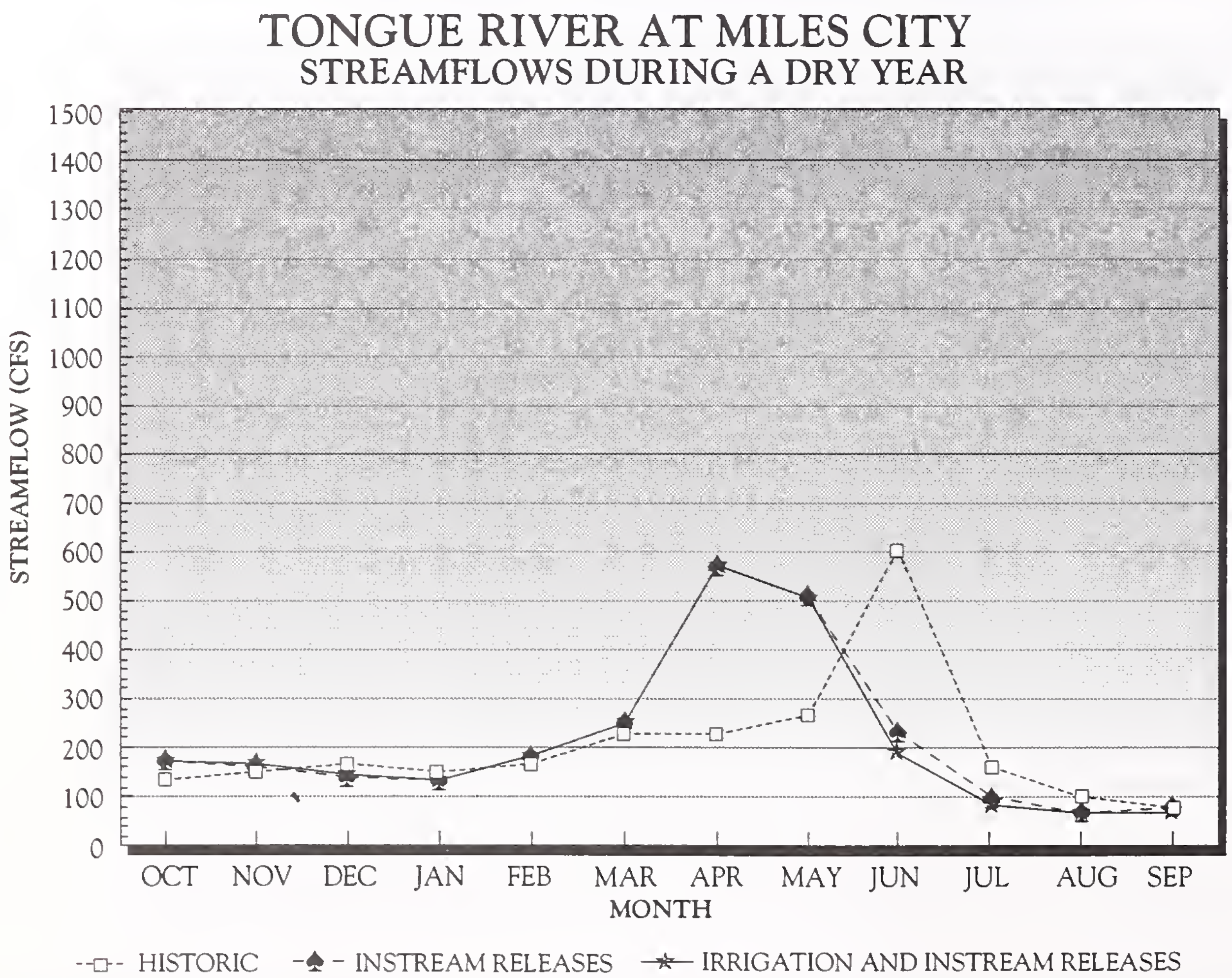
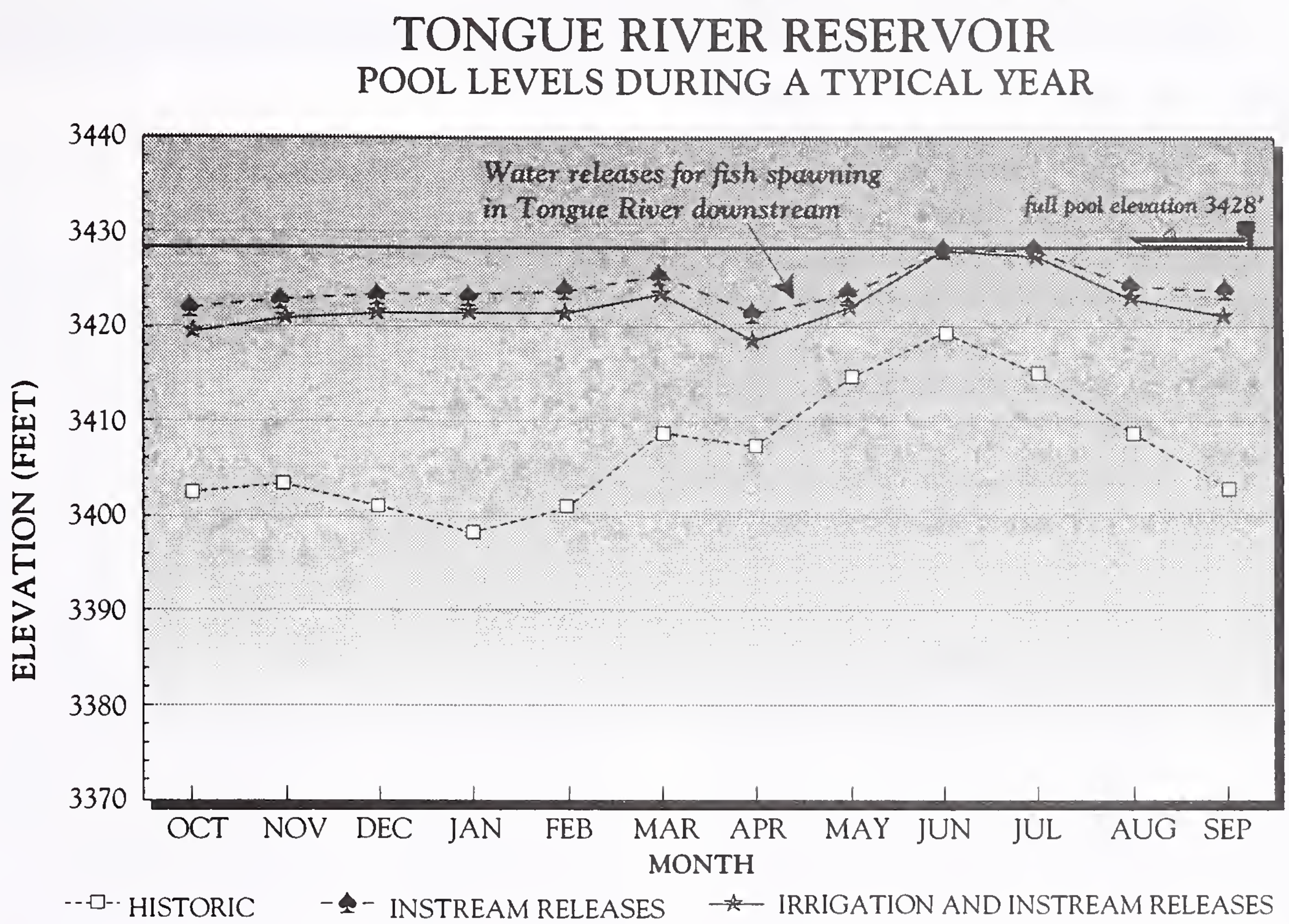


Figure 4-16. Tongue River Flows at Miles City With Potential Tribal Water Development



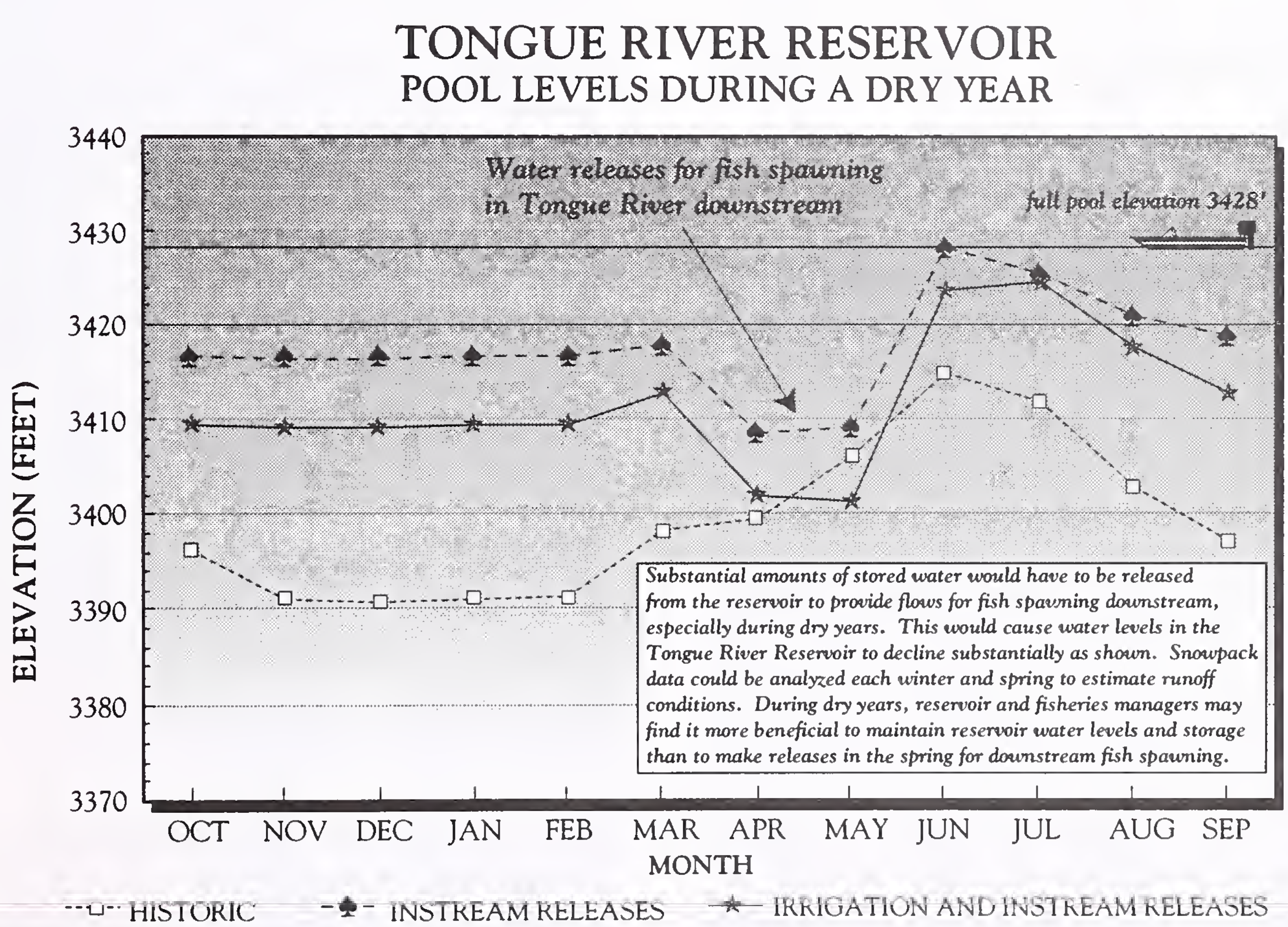


Figure 4-17. Tongue River Reservoir Levels With Potential Tribal Water Development

flow rates are equaled or exceeded under current conditions. Because the Tongue River Basin flow model is based on a monthly time step, the percentage of time a flow is exceeded during a two week period is not indicated; the percentage of time the instream flow is equaled or exceeded during a month is indicated instead. **Table 4-15** also indicates the percentage of the time that the instream flow necessary to maintain aquatic habitat would be equaled or exceeded under each of the alternatives and scenarios considered. Under the Tribal irrigation scenario, much of the Tribe's water would be released during the spring sauger spawning season and during the summer irrigation season. Flows needed to maintain aquatic habitat would be equaled or exceeded more frequently during April and May on all four reaches of the Tongue River (**see Table 4-15**). In general, during the summer irrigation season, flows necessary to maintain aquatic habitat would be equaled or exceeded less frequently than they now are, especially below the T&Y diversion and instream flow targets would be met less frequently during the fall.

4.24.1.5 Land Use

The Tribal irrigation scenario would provide water for development of approximately 4,900 acres of new irrigated lands on the Northern Cheyenne Reservation (**see Figure 4-13**). Based on the existing inventory of developable lands, these new developments would convert approximately 2,571 acres of dryland croplands, 2,323 acres of grassland/ rangelands, and 137 acres of forested lands to long-term use as irrigated croplands (**see Figure 4-14**). This would increase present Rosebud county irrigated croplands of 33,280 acres by approximately 15 percent, a moderate increase. It is likely that increases in irrigated cropland production would cause some reductions in dryland crop acreages presently providing some of this crop production.

Irrigation development generally requires development of associated facilities such as new roads, canals, pipelines and electric distribution lines. These facilities often require up to 10 percent of the land area that is to be irrigated. The details of these associated facilities are unknown at this time, but would be developed as specific irrigation proposals are designed and developed.

4.24.1.6 Recreation

For the recreation use period between April and September at Tongue River Reservoir, the increased storage capacity in the reservoir that would occur during most years would provide more surface area for water-based recreation activities, decreasing traffic congestion and the potential for user conflicts at locations such as the constricted channel near Sand Point. Higher reservoir elevations also would displace all shoreline activities to higher ground, with possible increases or decreases in site suitability for activities and user enjoyment because of site variables such as slope and vegetative cover. Overall, the new reservoir shoreline would consist of less gently sloping ground with a narrower band of vegetation than current conditions.

During typical years, the 7-10 foot fluctuation in reservoir elevation that would occur between April and September would be less than the 12-foot fluctuations that occur now. Shallow water depths within the bay at Campers Point would leave it partially dry during April, and the bay would not be fully accessible to boats during the Memorial Day weekend at the end of May (elevation 3,422 feet) due to insufficient water depth for boat passage. Reservoir levels would approach full pool during June and then would decline until the end of September. Planned boat ramps would be usable during the spring and summer at modeled elevations. Shoreline locations at the flat-lying areas of PeeWee Point and Sand Point would be from 400 to 600 feet from planned park improvements and roads during April, May, August, and September. These exposed areas could be used for rustic camping depending on their accessibility to motor vehicles and individual preferences for camping locations.

During dry years, the combined use of water for irrigation and releases for spring fish spawning would result in the reservoir fluctuations of up to 23 feet, creating reservoir levels at the end of May below historic levels. Elevations near 3,400 feet during April and May would make one planned boat

TABLE 4-15: Changes in flow affecting aquatic habitat in the Tongue River under existing conditions and with Tribal water development and future Wyoming water development

Tongue River reach:	Approximate flow necessary to maintain aquatic habitat [1] time period	flow (cfs)	Month	% of the time flow is equaled or exceeded under existing conditions	% of the time flow is equaled or exceeded with full (40,000 afy) Tribal development	% of the time flow is equaled or exceeded with full Wyoming development, no Tribal development	% of the time flow is equaled or exceeded with full Tribal and full Wyoming development	% of the time flow is equaled or exceeded with full Tribal instream release, no Wyoming development	% of the time flow is equaled or exceeded with 18,200 afy Tribal irrigation and instream release, no Wyoming development
Dam to Four-Mile Creek	January	150	January	72	73	43	43	73	73
	February	150	February	69	85	49	49	84	84
	March	150	March	75	86	48	48	86	86
	April	150	April	90	98	94	94	96	95
	May	700	May	61	66	36	18	96	95
	June	700	June	76	84	49	40	66	62
	July 1-15	700	July	24	15	3	3	14	12
	July 16-31	150	July	98	98	98	96	98	98
	August	150	August	94	97	97	94	96	94
	September	150	September	91	97	89	87	94	92
	October	190	October	64	98	95	98	93	93
	November	190	November	69	8	4	3	77	77
	December	150	December	80	74	64	64	73	73
Four-Mile Creek to S-H diversion	January	150	January	91	85	75	77	83	84
	February	150	February	83	92	63	63	91	91
	March	150	March	83	97	71	71	96	96
	April	390	April	47	37	4	3	96	94
	May 1-20	390	May	82	98	88	95	97	98
	May 21-31	700	May	56	52	23	12	94	92
	June	700	June	77	82	50	34	66	61
	July 1-15	700	July	26	13	3	3	15	12
	July 16-31	150	July	98	98	98	94	98	98
	August	150	August	91	96	95	92	95	94
	September	150	September	95	97	97	87	95	92
	October	150	October	91	98	98	98	98	98
	November	150	November	81	98	98	98	98	98
	December	150	December	87	85	74	76	84	85
S-H diversion to T&Y diversion	January	190	January	48	24	17	17	43	44
	February	190	February	57	48	43	43	50	50
	March	190	March	84	82	71	71	88	87
	April	400	April	39	28	15	15	92	90
	May 1-20	400	May	82	76	67	47	98	98
	May 21-31	700	May	51	44	72	6	57	57
	June	700	June	71	72	55	34	65	58
	July 1-15	700	July	71	15	4	3	17	17
	July 16-31	190	July	88	75	67	65	85	83
	August	190	August	86	39	39	36	78	78
	September	190	September	73	32	27	27	48	43
	October	190	October	73	71	68	68	78	79
	November	190	November	71	33	30	33	66	68
	December	190	December	57	32	11	16	48	48
T&Y diversion to Yellowstone River	January	190	January	48	24	17	17	44	44
	February	190	February	68	64	54	54	69	69
	March	525	March	38	33	26	26	33	32
	April	525	April	36	27	11	10	91	87
	May	600	May	52	45	22	6	58	58
	June	600	June	80	78	56	36	66	65
	July 1-15	600	July	26	17	7	5	19	18
	July 16-31	225	July	71	49	45	40	55	50
	August	225	August	26	7	5	5	15	15
	September	190	September	63	19	16	14	27	27
	October	190	October	71	64	61	61	77	77
	November	190	November	71	33	30	33	66	68
	December	190	December	57	32	11	16	48	48

[1] *Instream flow requirements from Montana Fish and Game Commission 1976*

ramp unusable, and the second planned ramp at its lowest point. During the Memorial Day weekend, some new park facilities (potable water, shelters, latrines) would be more than 900 feet from water at Sand Point and more than 2,000 feet from water at Campers Point. The reservoir would reach its highest elevation by the end of July (3,424 feet) but would still be 4 feet below full pool. Elevation decreases of 12 feet by the end of September would again expose large expanses of bare ground. The bay at Campers Point would not be accessible to boats during April, May, August, and September, but would likely be accessible during June and July.

During wet years, the approximate 4-foot fluctuation in reservoir elevations during April, August and September would result in developed park facilities being from 200 to 400 feet from the reservoir edge at PeeWee Point and Sand Point. The bay at Campers Point would likely be accessible to boats through September. Most summer months would have full pool conditions, with developed park facilities adjacent to the water, boat ramps fully usable, and the entire bay at Campers Point accessible to boats. Opportunities for rustic camping would be reduced at full pool because of inundation of flat-lying portions of the state park.

Recreationists fishing and floating the canyon stretch of Tongue River below the dam would experience early spring flows (April and May) from 2 to 3 times higher than those now present during typical and dry years. These high spring flows would extend the entire river length below the dam to Miles City. During June of most years, peak river flows would rapidly decline to levels less than those now present. Except for very wet years, recreationists would experience fairly uniform streamflows during early spring (April) and late summer months. Improved aquatic habitat and streamflows under this scenario could influence fish abundance and angler success in the long term.

4.24.1.7 Water Quality

Water quality of the Tongue River is typical of plains streams that drain the Fort Union Formation in semi-arid eastern Montana. During runoff, concentrations of dissolved solids (the sum of all the dissolved materials in the water) are typically lowest and at low flow, concentrations increase. Under existing conditions, the salinity of the Tongue River limits suitability for irrigation use in the late summer and fall months of dry years; at these times dissolved-solids concentrations may range from 500 mg/l to 800 mg/l (Dalby 1996).

Generally irrigation with water having dissolved-solids concentrations less than 500 mg/l has no adverse affect on crops. Water in the range of 500 to 1000 mg/l poses a moderate hazard to salt sensitive crops. Irrigation water with dissolved-solids concentrations between 1000 and 2000 mg/l may adversely affect many crops (including alfalfa) and special irrigation water management may be required to prevent salt accumulation in the soil profile. Water that exceeds 2000 mg/l poses a severe hazard and is generally considered unsuitable for irrigation use (Ayers and Wescot 1985). Irrigation with water high in dissolved-solids concentration can cause crop damage, reduced soil productivity and in extreme cases, lasting soil damage--especially if the water is high in sodium (Ayers and Wescot 1985).

Rough estimates of the effects of the four development scenarios on dissolved-solids concentrations of the Tongue River at Miles City were made by determining streamflow and dissolved-solids concentrations for historic median (Q50) and dry (Q80) conditions. Streamflow depletions (or additions), calculated by the Tongue River Model, were then subtracted from (or added to) the historic Tongue River at Miles City flows, and the historic dissolved-solids concentrations were adjusted to provide the new (developed) value (Dalby 1996). Results of the analysis were used to indicate the potential for each of the four scenarios to increase dissolved-solids concentrations of the Tongue River and further limit the suitability of water for irrigation use.

The Tribal Irrigation Development Scenario would increase dissolved-solids concentrations of the Tongue River at Miles City in most months. Under median and dry streamflow conditions, the depletions for irrigation would cause the largest increase in dissolved-solids during the late irrigation season (July through September). Increases would be largest under dry (Q80) streamflow conditions and

water would pose a moderate salinity hazard for irrigation use. The increase in salinity would be the greatest near Miles City and progressively less, upstream towards the dam.

Arsenic

Arsenic is a carcinogen and an EPA priority pollutant. The 1995 Montana legislature increased the ambient standard from 0.018 micrograms/liter to 18 micrograms/liter. If the ambient surface water concentration exceeds 18 micrograms/liter, then development that would cause an increase in arsenic concentration is prohibited.

Table 4-16 shows historic total recoverable arsenic concentrations measured in the Tongue River and the Yellowstone River. Although arsenic is present in the Tongue River, it is generally found at levels less than the detection limit of 1 microgram/liter. Arsenic concentrations are higher in the Yellowstone River and the median value is about 6 micrograms/liter near Miles City.

Additional irrigation within the Tongue River basin would probably reduce ambient Tongue River arsenic concentrations, due to soil chemical processes (adsorption) that remove arsenic from water filtering though the soil profile.

TABLE 4-16: Historic Total Recoverable Arsenic Concentrations Measured in the Tongue River Basin and the Yellowstone River at Miles City, MT.[1]

Station	Number of Samples	Minimum (ug/l)[2]	Median (ug/l)	Maximum (ug/l)
Tongue River at Stateline	20[3]	<1	<1	<1
Tongue River below Dam	29	<1	<1	5
Tongue River near Birney, MT	11	<1	2	2
Tongue River at Miles City, MT	15	<1	<1	2
Yellowstone River at Miles City, MT	22[3]	<1	6	9

[1] Data retrieved from USGS WATSTORE/NWIS Database.
[2] ug/l= micrograms per liter; equivalent to parts per billion.
[3] Samples analyzed for dissolved arsenic.

The potential effect of the four development scenarios on arsenic concentrations in the Yellowstone River was evaluated using a worst-case analysis (Dalby 1996). The following assumptions were made:

1. The highest arsenic concentration in the Yellowstone River at Miles City (9 micrograms/liter) occurred at the lowest daily flow of record, 966 cfs.

2. The Tongue River contributed 200 cfs or about 20 % of the Yellowstone flow.

3. Under worst-case depletion conditions, all of the Tongue River contribution to the Yellowstone River is consumed (the Tongue River is "dried-up").

Given these assumptions, the Yellowstone River arsenic concentration of 9 micrograms/liter would be increased to 11 micrograms/liter -- well within the development limits set by Montana's revised arsenic standard. Under more realistic conditions, the Tongue River represents a much smaller proportion of the Yellowstone River flow (typically less than 3%) and the effect of Tongue River depletions on Yellowstone arsenic concentrations would not be measurable.

4.24.2 Tribal Instream Flow Development Scenario

This scenario assumes that the Tribe would use or lease its water for instream flows rather than for agricultural development. On average 570 cfs would be released during April and 420 cfs during May for sauger and shovelnose sturgeon spawning in the lower Tongue River. To protect the reservoir fishery, these releases would only be made when reservoir contents are above 20,000 af. Reservoir releases also would be made during low flow periods to maintain minimum instream flows in the lower Tongue River (below the T&Y diversion). These releases would be made when flows at Miles City drop below about 75 cfs, but only if reservoir contents are above 20,000 af.

The Tribal Instream Flow Development Scenario provides an evaluation of the Tribe's identified

present and reasonably foreseeable use of its Compact water. The proposed downstream releases under this scenario, especially in conjunction with the inclusion of an auxiliary low-level outlet works as part of the rehabilitated Tongue River Dam, will provide a distinct positive benefit to the downstream aquatic ecosystem by eliminating the chronic dewatering of the Tongue River that has occurred periodically in the past.

4.24.2.1 Hydrology

Under the Tribal Instream Flow Development Scenario, peak flows below the dam and at Miles City will occur during April and May, when water is released for fish spawning (**figures 4-18 and 4-19** and **Appendix E**). Under existing conditions, peak flows in the Tongue River coincide with the peak runoff during May and June. During the rest of the year, flows below the dam and at Miles City will be similar to historic conditions (**figures 4-18 and 4-19** and **Appendix E**), although somewhat lower during the summer at Miles City.

Reservoir elevations under this scenario would be higher than historic reservoir elevations (**Figure 4-20** and **Appendix E**). Water releases from storage during the early spring for fish spawning in the river downstream would cause reservoir levels to drop temporarily. During most years, sufficient water would be available before the end of runoff to refill the reservoir.

4.24.2.2 Vegetation

Grassland and hardwood vegetation would not be affected under the instream flow scenario.

4.24.2.3 Wildlife

Wildlife habitat on the Northern Cheyenne Indian reservation would not be adversely affected under the instream flow scenario. Species such as beaver, mink and raccoon that inhabit riparian areas may benefit from higher flows, especially below the T&Y diversion in dry years.

4.24.2.4 Fisheries

Pool elevations in Tongue River Reservoir would generally increase under the instream flow scenario and increase the availability of aquatic habitat in the reservoir (**see Figure 4-20**). This would be most noticeable in dry years when reservoir pool elevations could be 13 to 18 feet higher in July and August than under existing conditions and as much as 25 feet higher during the winter.

In the Tongue River below the reservoir the percentage of the time flows would equal or exceed those necessary to maintain aquatic habitat would increase in all four reaches during April and May when releases for sauger spawning would be made (**see Table 4-15**). However, the percentage of the time flows to protect aquatic habitat would be met during June and July would decrease. Below the S-H diversion releases to improve sauger spawning in April and May would be partially offset by decreases in the percentage of the time flow targets to maintain aquatic habitat would be met in summer and early fall, especially in September.

4.24.2.5 Land Use

Land use would not be affected under the instream flow scenario.

4.24.2.6 Recreation

During typical years under this scenario, the approximately 7-foot fluctuation in reservoir elevation from April through September would be less than the 12-foot fluctuation now influencing recreation use at the reservoir. Lowest elevations would occur during early spring rather than late summer, with the bay at Campers Point partially accessible to boats during April. Water levels during April and May would put the reservoir shoreline from 200 to 400 feet from park roads and facilities on flat-lying portions of PeeWee Point and Sand Point. These areas would be available for camping use depending on their accessibility to motorized vehicles and individual preference for camping location. Planned boat ramps would be fully usable

during spring and summer. Full pool elevation would occur during June and July, creating conditions that complement use of developed park facilities, but decreasing area available for rustic camping. Elevation decreases of 4 to 5 feet during August and September would not affect use of the bay at Campers Point, but would again expose flat-lying portions of PeeWee Point and Sand Point for possible camping use.

During dry years, water releases for spring fish spawning would cause dramatic fluctuations in reservoir elevations (up to 20 feet) during April and May. Current reservoir fluctuations in dry years are about 15 feet. Low spring elevations of approximately 3,409 feet would place planned boat ramps at their lowermost reaches. Distances of the reservoir from relocated park facilities and roads would reach up to 600 to 800 feet on the flat-lying portions of PeeWee and Sand Points. Recreationists could use these exposed areas for camping and onshore boat docking where slope and access permit. The bay area at Campers Point would be totally dry during early spring and the Memorial Day weekend (elevation 3,409 feet), but would refill to usable levels for boats during June. Late summer reservoir elevation decreases of 8 to 10 feet, though less dramatic than spring levels, would make the bay marginally accessible to boats as low water levels increased the likelihood of prop damage.

During wet years, the 3-foot fluctuation in reservoir elevation that would occur between April and September would have effects similar to those for the Tribal irrigation development scenario. Full pool elevation that would occur by the end of May and continue through July would result in water close to new park facilities and adequate water depth for boats in the bay at Campers Point but would decrease the area available for rustic camping. Elevation decreases of 2 to 3 feet during August and September would not substantially affect use of developed recreation facilities at the park.

Recreationists using the Tongue River below the dam would experience streamflows and effects under this scenario similar to the Tribal irrigation development scenario.

4.24.2.7 Water Quality

Under median streamflow conditions, changes in dissolved-solids concentrations in the Tongue River at Miles City would be small in most months. In dry years, dissolved-solids concentrations would increase in June through August and during the winter; increases would create a moderate salinity hazard for irrigation use. Effects on salinity would be greatest near Miles City and progressively less toward the Tongue River Dam.

4.25 IMPACTS FROM THE YELLOWSTONE RIVER COMPACT

4.25.1 Background

The Yellowstone River Compact was signed by Montana, Wyoming, and North Dakota in 1950. It allocates water in the entire Yellowstone River basin among the three states. Relevant to the proposed Tongue River Basin Project, are sections in the Yellowstone River Compact regarding Tongue River flow allocations between Montana and Wyoming.

The apportionment of Tongue River water between Montana and Wyoming is governed by two relatively simple concepts: 1) that appropriative rights existing prior to January 1, 1950 are protected and administered under the doctrine of prior appropriation, and 2) that the remaining flow is to be allocated 60 percent to Montana and 40 percent to Wyoming. However, there is some confusion as to what constitutes a pre-1950 appropriative right.

Wyoming maintains that its citizens have pre-1950 rights to undeveloped "supplemental water," and the compact makes mention of these supplemental rights. The supplemental water could be used to supply existing irrigated lands that have inadequate water supplies. Wyoming estimates that it is entitled to consume about 18,700 afy under these supplemental rights. Montana water law has no supplemental water provisions. However, Montana maintains it has rights to 9,900 afy of supplemental water in the basin. Wyoming and Montana also have tentatively agreed to consider any increase in

agricultural water use that has occurred since 1950 to the present to be considered pre-1950 supplemental water uses (500 afy for Wyoming and 9,400 afy for Montana). Montana also believes that the water allocated to the Tribe through the Northern Cheyenne-Montana Water Rights Compact should be considered a pre-1950 right.

To more specifically address impacts to the aquatic ecosystem that would result from use of Yellowstone River Compact water, and at the urging of EPA, two hypothetical water use scenarios have been analyzed and included in the final EIS. One of the scenarios previously was presented in the draft EIS and examines the cumulative effects that a combination of full Tribal and full Wyoming water development under the Yellowstone Compact would have on the proposed expanded reservoir and streamflows in the Tongue River downstream. In this final EIS, a scenario of full Wyoming development with no Tribal development also is presented. This scenario was developed to separate impacts due to Wyoming water development under the Yellowstone River Compact from those associated with Tribal water development. **Figures 4-18 through 4-20 and Appendix E** present modeled reservoir outflows, streamflows at Miles City, and reservoir elevations for the two above mentioned scenarios and historic conditions. Further discussions regarding impacts due to these scenarios are presented below.

4.25.2 Effects of Full Wyoming Development with No Tribal Development

Under this scenario Wyoming would develop all water allocated to it under the Yellowstone River Compact. Tribal development in the basin under this scenario is assumed to be only that associated with the Tribe's existing contract for 7,500 afy of stored water in the Tongue River reservoir. The scenario was developed to isolate the impacts of new Wyoming water development from those associated with new Tribal water development. This scenario was developed for discussion purposes only and in no way prevents the Tribe from developing any of its water for any purpose.

Typical reservoir outflows would be lower throughout the year under this scenario than those that have occurred historically. Average reservoir inflows would be about 210,000 afy with full Wyoming development as compared to about 312,000 afy under existing conditions. Hence, the amount of water available for release will be reduced substantially. During dry years, flows will be more similar to historic conditions because releases from storage could be made from the enlarged reservoir to partially offset the effects of decreased inflows.

Miles City flows would be lower than those that have occurred historically because (1) reservoir releases will be lower and (2) most water that is released during the irrigation season would be consumed upstream of or diverted into the T&Y canal, especially during dry years.

More efficient dam operations and increased storage could allow the reservoir to be maintained at higher levels than those that have occurred historically, even with substantially lower inflows.

Instream flows in the Tongue River below the dam would deteriorate significantly with full Wyoming development. As shown in **Table 4-15**, flows thought necessary to protect aquatic habitat would be equaled less frequently than under existing conditions during the winter in all four reaches below the dam.

From the dam to Four-Mile Creek, the percentage of time aquatic habitat flows would be met would remain the same or decrease during the spring, remain about the same during the summer, increase significantly during October, and decrease significantly during November. A similar pattern would occur from Four-Mile Creek to the S-H Diversion but during October there would be increases in the frequency that flows to protect aquatic habitat are met. Between the S-H Diversion and the T&Y Diversion, aquatic habitat flows would be met less frequently than under current conditions in all months but May. Below the T&Y Diversion, flows to protect aquatic habitat would be met less frequently in all months of the year.

Within the reservoir pool, elevations would remain the same or increase about 3 feet from January

through June in dry years, with full Wyoming development. However, pool elevations would decrease from July through December with decreases of nearly 19 feet occurring during October.

Full Wyoming development would increase dissolved-solids concentrations of the Tongue River near Miles City under median (Q50) and dry (Q80) streamflow conditions. Increased dissolved-solids concentrations in July through September of dry years would pose a severe salinity hazard and limit the suitability of water for irrigation. Effects on salinity would be greatest near Miles City and progressively less toward the Tongue River Dam.

4.25.3 Effects of Full Wyoming Development with Full Tribal Development

Under this scenario Wyoming would develop all water allocated to it under the Yellowstone River Compact, and the Tribe would develop fully its Compact water right for irrigation. With this level of development in the basin, typical reservoir outflows would be lower throughout the year than have occurred historically, except during the irrigation season of dry years when releases would be higher, primarily to supply new Tribal water demands.

Miles City flows would be lower than those that have occurred historically because (1) reservoir releases will generally be lower and (2) most water that is released during the irrigation season will be consumed upstream of or diverted into the T&Y canal, especially during dry years. Tribal irrigation development would place additional demands on water in the river between the dam and Miles City.

Reservoir fluctuation patterns under this scenario would be similar to those that occur under existing conditions during typical years, although overall reservoir elevations would be higher. During dry years, reservoir levels would be similar to those that have occurred historically, and the reservoir would not fill due to reduced reservoir inflows associated with Wyoming water development and the demands placed on the reservoir by additional Tribal water development.

Instream flows would deteriorate significantly below the dam when cumulative effects are considered. **Table 4-14** shows the cumulative effects of full Tribal irrigation development and Wyoming water development relative to the flow needed to fully maintain aquatic habitat on four reaches of the Tongue River. Currently, flows necessary to protect aquatic habitat are not always attained. For example, between the T&Y diversion and the Yellowstone River, the flow necessary to protect aquatic habitat in August (225 cfs) is only equaled or exceeded 26 percent of the time. Full Tribal irrigation development and Wyoming development would result in 225 cfs being attained only 5 percent of the time. As indicated in **Appendix E**, median August flows at Miles City would be only 36 cfs. Current marginal aquatic habitat conditions would be degraded further.

In the Tongue River immediately below the dam, the amount of time flow would meet or exceed that necessary to protect aquatic habitat would generally decrease in the fall, winter, and most of the spring, but would remain about the same during the summer. Similarly from Four-Mile Creek to the S-H diversion, the percentage of time flows would equal or exceed those necessary to protect aquatic habitat would, for the most part, decrease in winter and spring, remain about the same in the summer, and increase slightly in late fall.

Aquatic habitat in the river would be most affected below the S-H diversion. Here, there would be year-round reductions in the percentage of time flows meet aquatic habitat needs.

Within the reservoir, cumulative effects of the proposed project, full Tribal irrigation development, and full Wyoming development would be greatest in dry years. During dry periods which occur in 2 years out of 10, reservoir fluctuations would be greater than under current conditions. From late winter through spring, reservoir pools would be 1 to 3 feet higher during dry periods. However, from July through December the reservoir pool would be lower than present with elevations nearly 19 feet lower in October. Lower pool levels would likely result in decreased primary production and greater competition for available food. Fish stocking rates

may have to be modified if overall reservoir production of fishing success changes substantially.

Full Wyoming and Tribal development would have the greatest effect on Tongue River dissolved-solids concentrations. Under median (Q50) and dry (Q80) streamflow conditions, increased dissolved-solids concentrations in July through September of dry years would pose a severe salinity hazard and limit the useability of water for irrigation. Effects on salinity would be greatest near Miles City and progressively less toward the Tongue River Dam.

Preliminary analysis shows that each of the alternatives, especially those involving full Wyoming development, will have an effect on water quality of the Tongue River. At some point, additional future consumptive use of water will create salinity problems and limit the suitability of water for irrigation use. Future water allocation decisions will need to account for salinity effects; this can be accomplished by developing (calibrating and verifying) a Tongue River Salinity Model capable of mass-balance routing of dissolved-solids and sodium (possibly other conservative constituents). The development of such a model likely will be part of future environmental compliance activities required under the Settlement Act to be completed when the Tribe proposes specific water uses.

4.26 IMPLEMENTATION OF FISH AND WILDLIFE HABITAT ENHANCEMENT FEATURES

Enhancement features discussed in this section were presented in **Chapter 2, *Fish and Wildlife Habitat Enhancement Features***, and **Appendix C**. These features would be implemented singularly, or as groups, as the program was carried out.

A recap of potential enhancement features is provided on **Table 4-17**. Resources that are likely to experience effects as a result of implementing a feature are displayed in **Table 4-18**. Individual effects of implementation will also serve as the basis for screening features during subsequent planning stages. The identification of an adverse impact may require modification or elimination of a feature from further consideration. Impacts are discussed only in general terms because the timing, location, and extent of enhancement activities are not yet known. Environmental compliance would be conducted, however, as enhancement features were implemented.

TABLE 4-17: Potential Enhancement Features

1. Acquire lands of high habitat value through purchase or easement to enhance or protect those values.
2. Develop and enhance existing wetland sites.
3. Develop stock pond/small wetlands.
4. Construct wetlands.
5. Enhance aquatic habitat.
6. Enhance riparian habitat.
7. Enhance upland habitat by providing water, shelter belts, dense nesting cover, food plots, and sediment control.
8. Enhance instream flows by: 1) a water rights acquisition program; 2) monitoring and enforcement of diversion; 3) a streamflow gauging program.
9. Provide fish passage around diversion dams.
10. Screen inlet structures at diversions.
11. Initiate livestock management and exclusion systems.
12. Enhance the Tongue River Reservoir perimeter.
13. Install bird nesting structures along the Tongue River corridor and reservoir shoreline.
14. Remove trash and car bodies from selected sites.
15. Develop weed control programs.
16. Develop cooperative programs with private landowners and agencies and develop a habitat conservation education program as part of an overall ecosystem management planning activity.
17. Provide short grass/native prairie ecosystem management/enhancement on the Northern Cheyenne Reservation including prairie dog reestablishment in plague-affected areas on the reservation, and a bison restoration program.

TABLE 4-18: Resources That Could be Affected Adversely or Beneficially by Implementation of Enhancement Features

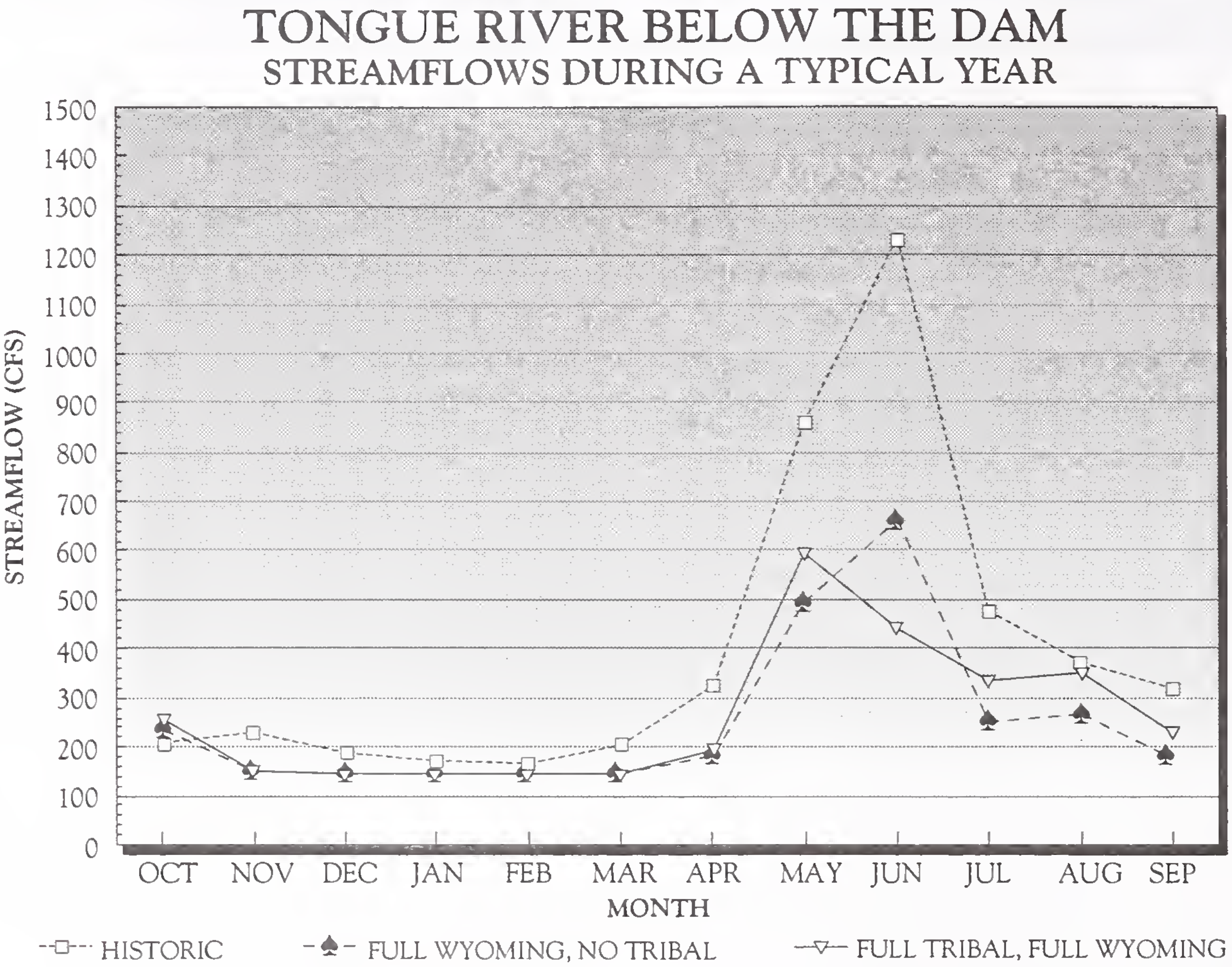
	Soils	Hydrology	Wetlands	Aquatics/ Fisheries	Wildlife	Vegetation	Biodiversity	Social Conditions	Economic Conditions	Recreation	Land Use & Ownership	Cultural Resources	Visual Resources
Acquire lands	x	x	x		x	x	x	x	x	x	x	x	
Develop & enhance wetlands	x	x	x	x	x	x	x		x	x	x	x	x
Develop stock-ponds/wetlands	x	x	x	x	x	x	x		x			x	
Construct wetlands	x	x	x	x	x	x	x		x			x	
Enhance aquatic habitat		x		x		x	x		x	x	x	x	
Enhance riparian habitat	x	x	x	x	x	x	x	x	x	x	x	x	x
Enhance upland habitat	x	x			x	x	x	x	x	x		x	x
Enhance streamflows		x		x			x		x	x	x		
Provide fish passage		x		x			x	x	x			x	x
Screen inlet structures				x			x		x			x	
Initiate livestock management and exclusion systems	x	x	x	x	x	x	x		x		x	x	x
Enhance Tongue River perimeter	x		x		x	x	x		x			x	x
Install bird nesting	x	x			x				x			x	
Remove trash & car bodies						x			x			x	x
Weed control	x				x	x	x		x				
Co-op program & education of land- owners								x	x				
Native prairie mitigation & enhancement	x	x	x		x	x	x	x	x	x		x	

***Source:** Developed by MME Corp. 1994.*

4.26.1 Soils

Soils present both limitations and suitability concerns for implementing enhancement features. Physical soil characteristics and topography determine the suitability of a site for an engineering feature or revegetation success. Characteristics that classify soils/site as prime or unique agricultural land or land of statewide importance can serve as constraints to development regardless of physical suitability. Enhancement features could benefit soils via erosion control measures, and impact soils from exposure, use, and disturbance associated with structural measures. Irreversible commitment of soils to enhancement features also would result.

Sediment control would require detailed soils and watershed yield analyses as well as design considerations for visual, cultural resources, hydrology, and additional economic impacts. Sediment control usually includes a watershed/soil conservation plan that would involve indirect impacts to social conditions and land use and ownership.



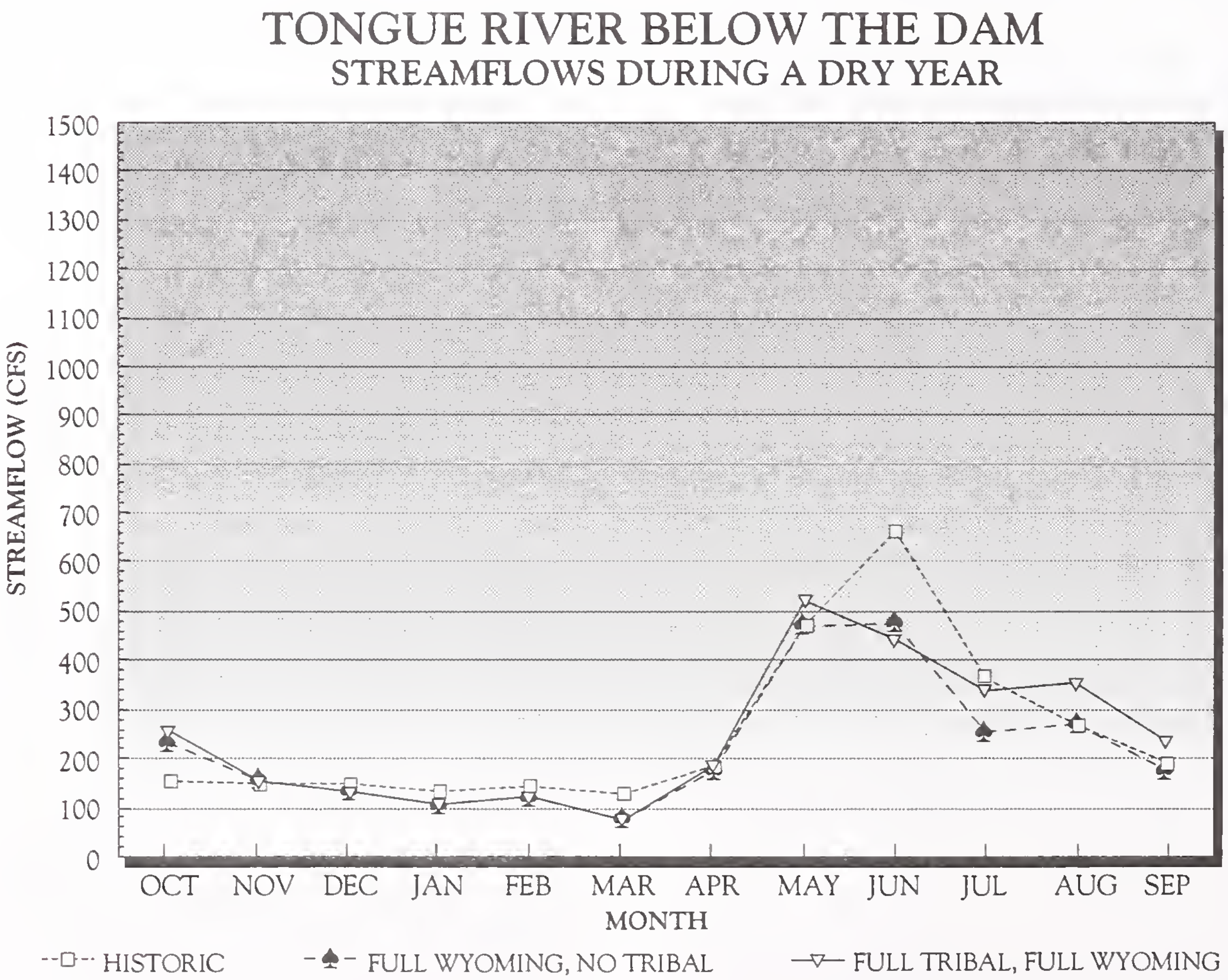
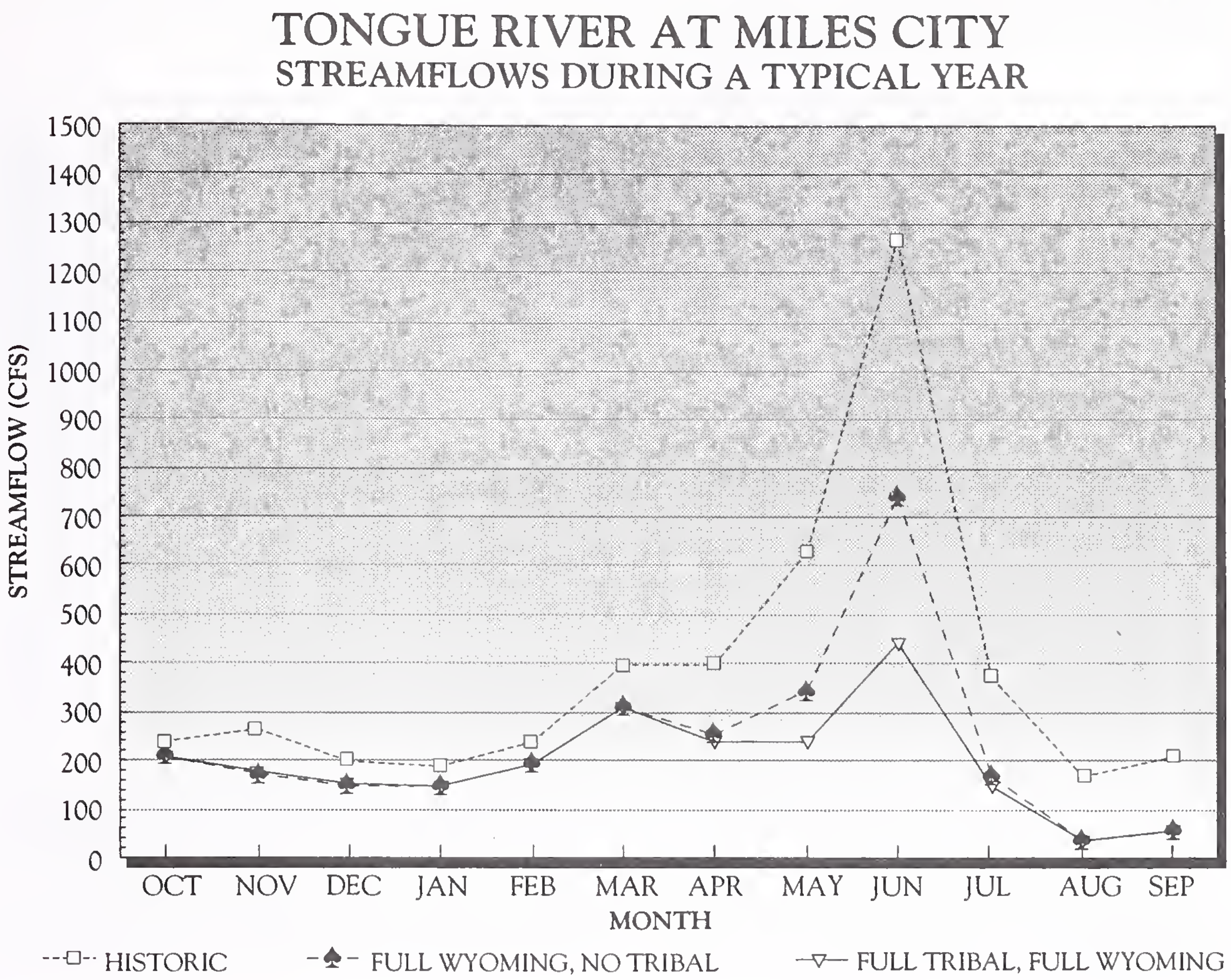


Figure 4-18. Tongue River Flows Below The Dam With Potential Wyoming Water Development



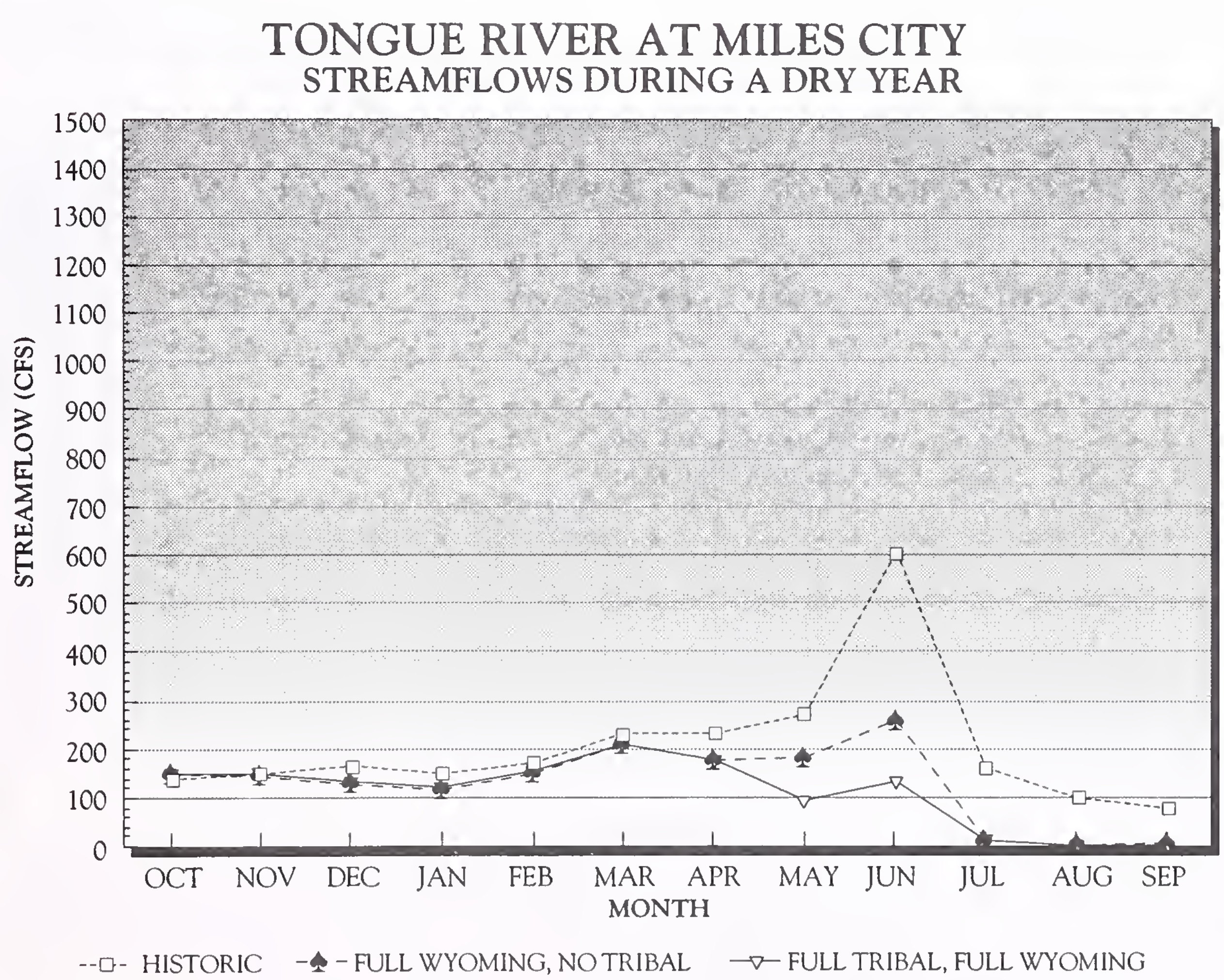
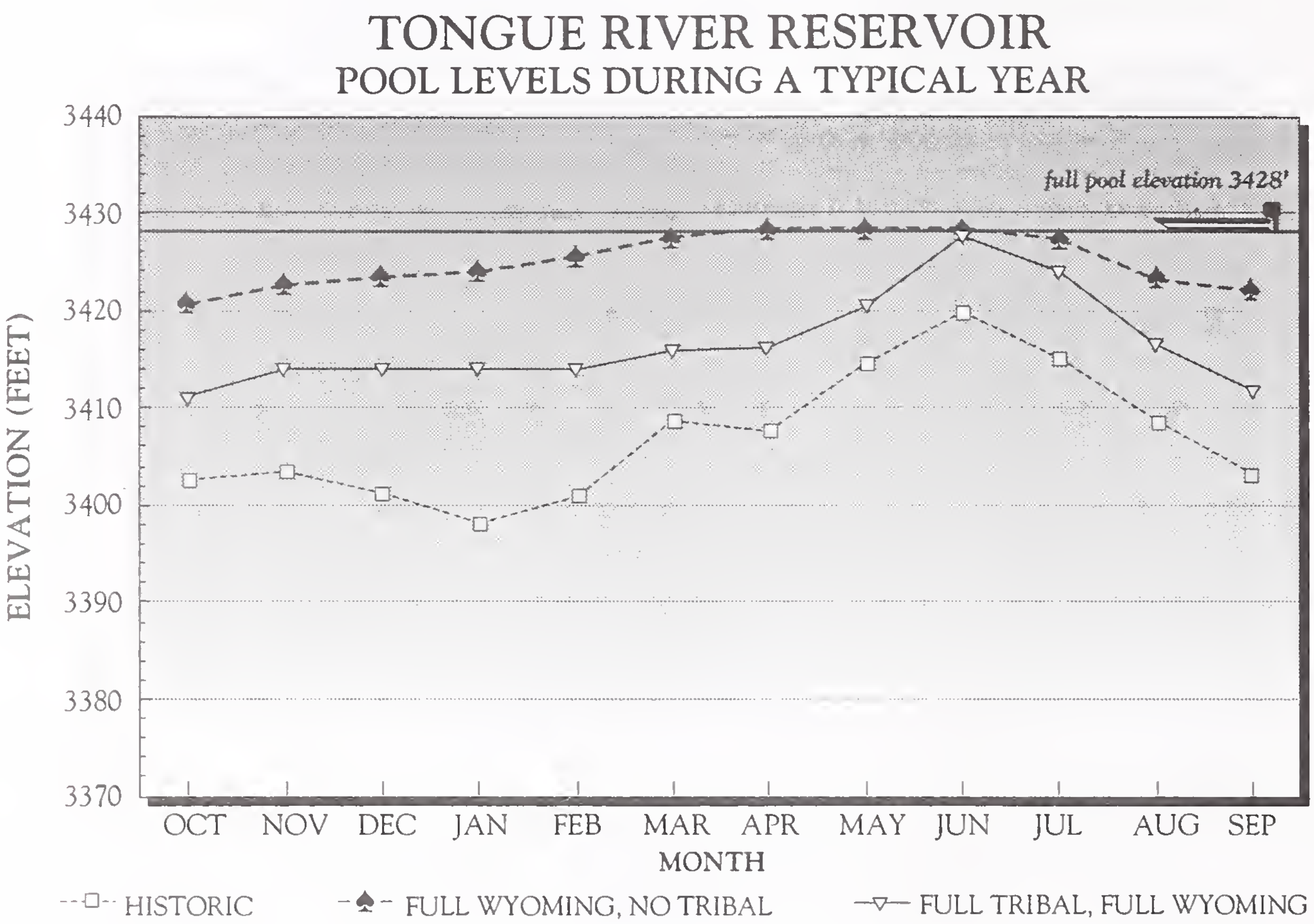


Figure 4-19. Tongue River Flows At Miles City With Potential Wyoming Water Development



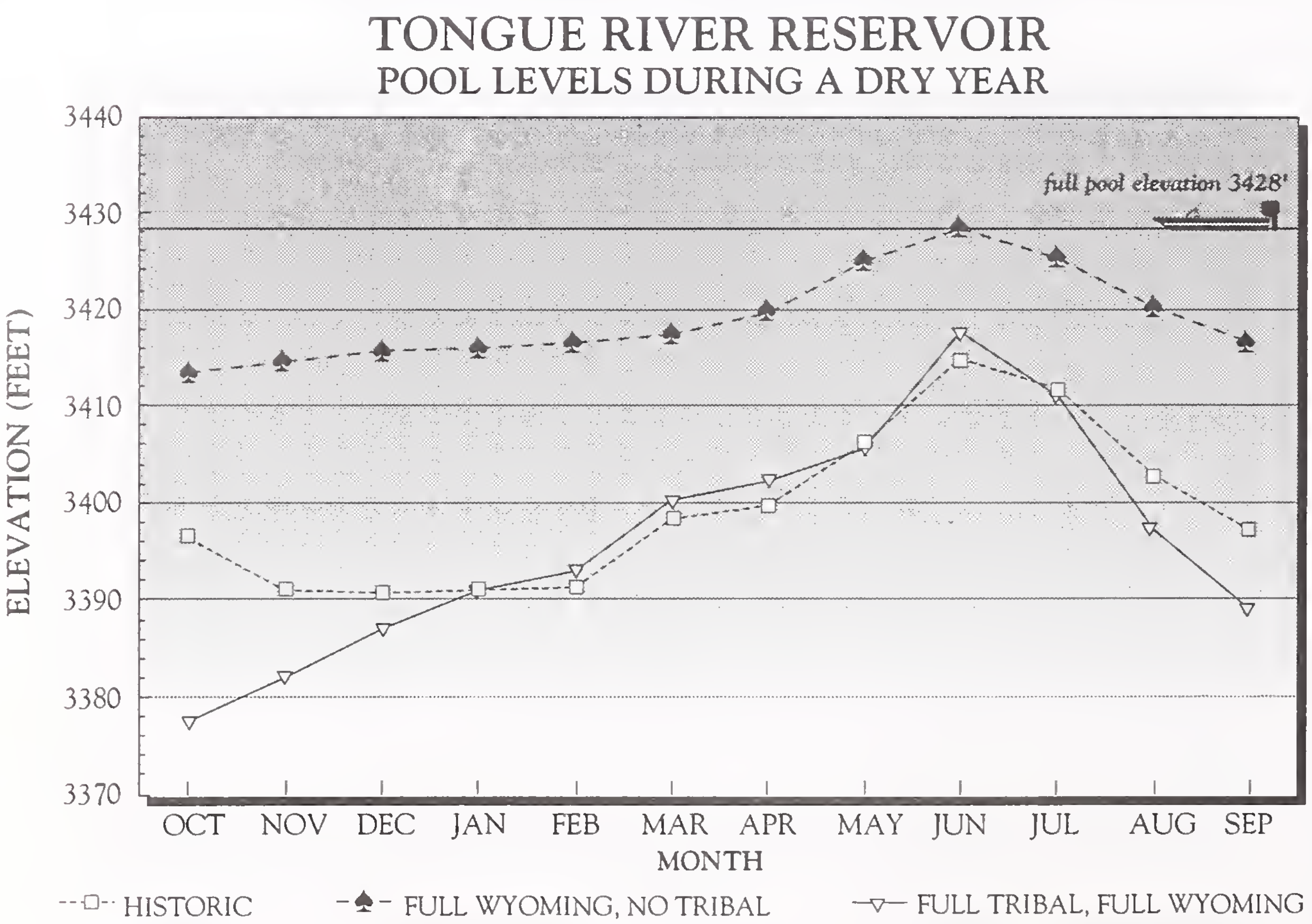


Figure 4-20. Tongue River Reservoir Levels With Potential Wyoming Water Development

4.26.2 Hydrology

When water and water source development is a component of an enhancement feature, the design process must include an evaluation of water quantity available for use as well as an analysis of the impacts of the proposed use on surface and groundwater regimes, quality, and competing uses. A water-use permit would have to be obtained from DNRC for enhancement projects that would use surface or groundwater. Impoundments constructed for water source development or sediment trapping may affect surface water, local groundwater, and the likelihood of success in accomplishing enhancement objectives. Since the ability of water to carry sediment is based on hydraulic characteristics, eliminating a sediment source may cause the river to scour an area to obtain its sediment load. Enhancement features could impact water quantity and quality if they include water source development, sediment traps and erosion control, evaporation of ponded water, and accelerated transpiration by water-loving vegetation.

4.26.3 Wetlands

Enhancement measures may increase biological diversity of plant communities by creating wetlands on sites that currently are predominated by upland species (hayfields, pasture, and previously disturbed sites). Replacement of upland plant non-native species by wetland plant species would increase species diversity locally but would have negligible effects on species diversity regionally. Typically, created wetlands are relatively low in species diversity and are comprised of pioneer plant species that are relatively common regionally. These newly created wetlands would likely be populated by wildlife species such as red-winged blackbirds and other relatively common species able to adapt to plant communities in early stages of ecological succession.

Impacts to biological diversity would be reduced if wetland enhancement was implemented on sites that have been disturbed by past activities (e.g., drained wetlands, areas converted to cropland, and mined areas). Protection and management of diverse, natural habitats would be consistent with objectives of ecosystem management. Protection alone, however, may not be adequate mitigation of wetland impacts and some enhancement or creation of wetlands may be required. Typically, jurisdictional wetland mitigation under Section 404 of the Clean Water Act requires creation of new wetlands to offset losses that would occur. The intent of mitigation under the Clean Water Act is to ensure no net loss of wetland functions and values.

4.26.4 Aquatics/Fisheries

Impacts to aquatics and fisheries would involve trade-offs, since the availability of water in the basin is finite. Water used for wetlands enhancement could adversely affect habitat elsewhere, depending on the source from which it was taken. If water rights were acquired that were previously applied to agriculture, aquatic/fisheries habitat would be enhanced. If sources supplying existing aquatics/fisheries habitat were used, trade-offs would need to be made as to the functions and values of the habitats involved. Impacts to water quality either beneficial or adverse, would indirectly affect aquatics/fisheries as well. Enhancing aquatic habitat would benefit aquatics and fisheries species by stabilizing their habitat requirements and indirectly could offer increased angling opportunities.

4.26.5 Wildlife

Effects on wildlife would be dependent on the site and habitat types involved. Conversion of upland sites to wetlands may increase breeding habitat for some species of waterfowl, (primarily "puddle ducks" such as mallard and teal) if dense stands of vegetation are present for nesting near the water bodies. Amphibians and reptiles may be able to use wetlands if existing populations of these animals are close enough to created wetlands to colonize them. In the project area, it is extremely difficult for amphibians and reptiles to disperse over vast areas of semiarid upland habitat to colonize newly created, isolated wetlands. Migratory shorebirds and waterfowl would likely use created wetlands for nesting and feeding in spring and fall.

Landownership changes could result in permanent protection of habitat, and therefore should be beneficial to wildlife. Providing nesting structures for birds should increase numbers of birds fledged from the basin. Location and numbers of structures installed would determine the extent and magnitude of this beneficial impact.

4.26.6 Vegetation

Overall impacts to vegetation from enhancement activities should be beneficial because of riparian plantings, wetland creation, livestock exclusion, noxious weed control, and more stabilized water levels. Mitigation and enhancement measures to convert native prairie habitats to artificial wetlands would cumulatively reduce amounts of native prairie habitat remaining in the Northern Great Plains. Agricultural development, overgrazing, mining, residential development, and other activities have reduced native prairie and associated wildlife populations which have a strong affinity for native grasslands and shrublands. Regionally, native prairie habitat is still present over large acreages, particularly on federally-managed lands.

4.26.7 Biodiversity

Enhancement activities that would have a high potential for increasing or protecting biological diversity include: acquiring and protecting lands with high habitat values; enhancing wetland and riparian habitat that has been degraded; establishing shelterbelts, nesting cover, and food plots; restoring native prairie species and habitat; enhancing instream flows; providing fish passages around irrigation diversions; installing bird nesting structures; and controlling noxious weeds. In addition, cooperative and educational programs with landowners would increase awareness of biodiversity and ecosystem protection in the basin.

To be consistent with the goals of ecosystem management, ecological functions and values of creating wetlands in native prairie habitat need to be evaluated relative to losses that would occur from this conversion. Conversion of native plant communities to artificial wetlands may conflict with ecosystem management guidelines which specify that: native species and habitats should be protected; rare and ecologically important species be protected; habitat fragmentation be minimized; and natural ecosystem processes be maintained.

4.26.8 Social Conditions

Impacts on social conditions would be beneficial and indirect and would generally improve natural conditions so that human activities on enhanced lands gave greater opportunity for enjoyment, education, recreation, plant gathering, and/or other cultural activities.

4.26.9 Economic Conditions

All enhancement features would impact economic conditions because: 1) they would require funding from government agencies and 2) would provide employment within the basin, primarily to the Northern Cheyenne. Economic effects could include minor fiscal impacts due to conversion of private-to-public landownership and possible loss of agricultural production. Economic effects would depend on the type of acquisition (e.g., fee title or conservation easement) and management prescriptions for acquired sites (e.g., some might remain in agricultural production for waterfowl habitat). Enhancement of some resources, such as fisheries, could draw more tourism to the basin.

4.26.10 Recreation

Impacts to recreation from enhancement would be indirect and could be both beneficial and adverse. Loss of access to and changes in use of properties in the basin may occur. Native prairie/ecosystem management programs may provide bison for hunting and/or viewing on the reservation. Overall, impacts to hiking, hunting, fishing, and wildlife viewing would be minor and beneficial unless key recreational sites were altered by enhancement.

4.26.11 Land Use and Ownership

Land/site acquisition could result in minor fiscal impacts due to conversion of private-to-public ownership in the basin. It is assumed that if the project sponsors acquired land for enhancement features, it would be more accessible to the public for recreation purposes. Impacts to land use and ownership are dependent on the specific site, the acquisition method, and the ultimate management of the site.

4.26.12 Cultural Resources

Any enhancement feature that involved land disturbance could impact cultural resources. Such activities would require further environmental review and consultation.

4.26.13 Visual Resources

Most enhancement activities would improve visual resources by maintaining or enhancing natural features such as vegetation. Structural improvements, such as stock waterers and fish passages, would have only negligible visual impacts.

CHAPTER 5

CONSULTATION AND COORDINATION

5.1 AGENCIES AND COMPANIES CONSULTED

In the course of preparing this EIS, the project sponsors and preparers of this document consulted and coordinated with a variety of agencies and companies.

- Members of the Northern Cheyenne Tribe were contacted about social customs and beliefs, ethnobotanical resources, and Tribal services provided on the reservation.
- Montana Department of Fish, Wildlife and Parks was contacted to provide consultation on fish and wildlife matters and about improvements to existing facilities at Tongue River State Park.
- Montana State Historic Preservation Officer was contacted regarding cultural and historic resources in the area.
- U.S. Army Corps of Engineers, Omaha District, was contacted about wetlands and Waters of the U.S.
- Montana Department of Transportation, Wyoming Department of Transportation, and Big Horn County were contacted about impacts to affected roadways, transportation corridors, and planned road projects in the area.
- Montana Department of Environmental Quality (DEQ) was contacted about air and water quality issues.
- U.S. Fish and Wildlife Service was contacted about federal threatened and endangered species, wetlands, and general wildlife issues in the proposed project area.
- Sheriff's departments in Big Horn and Rosebud counties, Montana, and Sheridan County, Wyoming, and the Montana Highway Patrol and Bureau of Indian Affairs Law Enforcement Office were contacted about law enforcement and traffic impacts.
- School districts in Big Horn County, Montana, were contacted about the impact of additional students to area schools.
- The former Montana Department of State Lands, now part of DEQ, was contacted about coal mines in the area and alluvial valley floors.
- Interstate Commerce Commission was contacted about the proposed Tongue River Railroad.
- Tongue River Railroad Company was contacted about the proposed Tongue River Railroad.
- Sheridan Area Water Supply Joint Powers Board was contacted about the proposed Twin Lakes project.
- Burlington Northern Railroad was contacted about rail facilities in the project area.
- U.S. Forest Service (Sheridan, WY) was contacted about the proposed Tie Hack project.
- Montana Riparian and Wetland Association was contacted for a delineation of jurisdictional wetlands in the area around Tongue River Reservoir that would be impacted by the proposed project.
- Dennis Blinkhorn, Wetlands Consultant, was contacted about jurisdictional wetlands in the area around Tongue River Reservoir that would be impacted by the proposed project and their associated functions and values, and for the preparation of a Clean Water Act Section 404(b)(1) Guideline Evaluation of the Tongue River Basin Project.
- Inter-Fluve, Inc. was contacted about jurisdictional wetlands in the area around Tongue River Reservoir that would be impacted by the proposed project, and for the preparation of a site-specific mitigation plan to offset the wetlands functions and values that would be lost to the project.

5.2
REVIEW OF THIS DOCUMENT

This EIS has been mailed to all parties who have expressed an interest in receiving it. Additional copies of the document are available on request from the Department of Natural Resources and Conservation. Copies of the EIS were mailed to the following state and federal agencies:

- Montana Department of Fish, Wildlife and Parks
- Montana Governor's Office
- Montana Environmental Quality Council
- Montana Intergovernmental Review Clearing-house
- Montana Department of Environmental Quality
- Montana State Historic Preservation Office
- Montana Department of Transportation
- Former Montana Department of State Lands
- Montana State University
- Montana Bureau of Mines and Geology
- Montana State Library
- University of Montana
- U.S. Bureau of Indian Affairs
- U.S. Bureau of Land Management
- U.S. Fish and Wildlife Service
- U.S. Interstate Commerce Commission
- U.S. Environmental Protection Agency
- U.S. Army Corps of Engineers
- U.S. Forest Service, Billings
- U.S. Natural Resource Conservation Service, Hardin
- U.S. Geological Survey
- Wyoming State Engineer's Office

5.3
PUBLIC INVOLVEMENT

Public meetings have been held since 1980 in the Tongue River Basin concerning the Water Rights Compact. The Montana Reserved Water Rights Compact Commission held several meetings in the early 1990s to provide information on the progress of Compact negotiations and to ask the public for questions or comments.

Three open house meetings were held in October 1991, to inform the public about studies for rehabilitating the dam. A brochure explaining the progress of a study, *Special Report: Tongue River Dam Rehabilitation*, was mailed to more than 400 individuals, groups, and agencies. At the Miles City open house, 19 people attended. Twenty-nine people attended in Ashland and 30 in Sheridan, Wyoming.

In 1993, the project sponsors conducted public scoping meetings to determine issues and concerns related to the Tongue River Basin project and to identify possible alternatives to be included in the draft EIS. Nine scoping public meetings were held in the project area. These meeting locations, dates, and number of people attending are listed in **Table 5-1**. A record of scoping activities and meeting minutes is on file at DNRC.

TABLE 5-1: Public Scoping Meetings

Meeting Location	Date	Number of Attendees
Busby	March 8, 1993	8
Lame Deer	March 8, 1993	16
Crow Agency	March 9, 1993	6
Sheridan, Wyoming	March 9, 1993	34
Birney	March 10, 1993	12
Birney Village	March 10, 1993	11
Ashland	March 11, 1993	7
Miles City	March 12, 1993	10
Billings	March 23, 1993	45

In addition to public scoping, a meeting was held on March 23, 1993 to discuss agency scoping issues. Representatives of lead permitting agencies, the consulting firm preparing the EIS, the Bureau of Indian Affairs, and a representative of U.S. Senator Conrad Burns' office were in attendance. Minutes of this meeting also are included in the scoping file at DNRC.

After publication, in June of 1995, the draft EIS was distributed to the following individuals and organizations:

Doyl Fritz
Sue Lowry
Hugo Muggli
J. T. Richer
William Long
Christine Valentine
Ducks Unlimited
Richard K. Aldrich
Randy Bowman
Misty Kellum
Doug Day
Walter Taylor
Tom & Donna Wimer
Steve Cutler
Roger Gaskill
Pavek, Inc.
Herb Mobley
Carol A. Bahr
Myron Brien
Steve Brady, Sr.
Rodger Parrish
Carl L. Gress
Ruby Braine
James & Jean Muller
Duane T. Bird Bear
Montana Audubon Council
Tom Asay
Robert Hanic
Bryan Harris
Ralph Knode
H. W. Rasmussen
Bruce Card
Mike Scott
Painted Arrow Ranch
William & Bernice Musgrave
William R. Musgrave
Don Kollekowski
Betty & Larry Alden
Joseph Kurkowski
Jack Knoblock
Lavon Conner
Audrey McCarthy
Art Peaslee
Roger Schoumacher
Kenneth A. Kania
Rick Stefanic
Northern Cheyenne Agency
Sen.Max Baucus Office
Norman Parrent
Art Hayes
Davis Squires,
BNG Consultants
Bitterroot Native Growers, Inc.
Suzanne Trusler
Thomas E. Ebzery
Harley R. Harris
Jim Hansen
Bonnie Lovelace
Don Hyyppa
Liter Spence
Joel Marshik
Joe Lalley
Larry Robson
Steve Oddan
David Pennington
Janet Singer
Joe Moreland
James Mason
Jay Meyer
Abe Horpestad
Stan Wilmoth
Steve Potts
Nancy Curriden
Marcus G. Faust, PC
Dana G. White
John Woodenlegs Memorial Library
Miles City Public Library
Parmly Billings Public Library
Sheridan County Fulmer
Great Northern Properties
Historical Research Associates
Mark & Debra Fix
Rex & Susan Mougold
Michael E. Webster
John Halbert
Tom Judd
Bruce A. Bugbee
Jeanne Whiteing
Stra, Inc.
Sharon Freeman
Michael Stevermer
John H. Hughes
Bertha Brown
Eileen McLanahan
Charlene Lopez
Medicine Wheel Alliance
Lloyd Brown
Brewster Ranch
Mr. & Mrs. Maynard Borner
Canyon Creek Cattle Co.
Owen L. Cartwright
Cynthia & Dale Axt
James W. & Marjorie Boulware
Brown Cattle Co.
Consolidation Coal Co.
Mark & Judy Bloxham
Jennette & Darold Brey
Jack & Nancy Carrel
Decker Coal Co.
Eugene Fessler
Kirk Green
Helm Hereford Ranch, Inc.
R. S. Hosford
Gene Lee
J. E. Dodds
John E. Hamilton
TR AG Partnership
Hunt Oil Co.
William C. & Pansy H. Jones
Tom Ketchum
Big Sky Ranch
Warren Dan Eddleman
Forest B. Dunning
Hubert Harwood
Dale Hofmann
John F. & Peggy L. Klamm
Alfred L. Leatherberry
Glenn McKelvey
Michael & Cheryl Melin
J. Donald Ochsner
Robert & Janet Pauley
Racine Peterson
Rocker Six Cattle Co.
State Board of Examiners
James & Phyllis Moffitt
Ow Ranch
Susan Fortune Pauley
C. Thomas & Patricia Pezzarossi
Steven D. & Beverly M. Shelley
Frank Stoltz
Moose Creek Ranch, Inc.
Donald P. & La Dell Muri
Nance Cattle Co.
Veronica & Joseph Panetta
Peabody Development Co.
Kelly & Cynthia Radue
St. Labre Mission
T & Y Farming
T Triangle Ranches, Inc.
W. C. Trusler
Cecil Wynes
Mike Thompson
Wiltse Cattle Co.
T Y Irrigation District
Town & Country Club
Ron Wells
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Berley & Slonim
Bruce Delaney
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Caribou Ranch
St. Labre Indian School
Indian Reference Library
Colorado State University
Scott Benson
Charlie Lei
Dave Malutich
West Texas A&M University
John Wheaton
April Martin
Jim Wickens
Richland County Conservation District

Following distribution of the draft EIS, and as part of an 82 day review period, the project sponsors conducted a series of public comment hearings. The date, location, and number of people attending each hearing are shown in Table 5-2. The hearings were held to solicit public and agency input regarding the proposed project and the adequacy of the environmental analyses contained in the draft EIS. All comments received at the public hearings, along with written comments submitted directly to the project sponsors, are included in this final EIS and are accompanied by formal project sponsor responses.

TABLE 5-2: Number of people attending hearings on the draft EIS

Date	Hearing Location	Number of People Attending
July 17, 1995	Busby, Montana	2
July 17, 1995	Lame Deer, Montana	0
July 18, 1995	Muddy District, Montana	0
July 18, 1995	Ashland, Montana	8
July 19, 1995	Birney Village, Montana	9
July 19, 1995	Sheridan, Wyoming	23
July 20, 1995	Miles City, Montana	12
July 21, 1995	Billings, Montana	7

CHAPTER 6

PREPARERS AND CONTRIBUTORS

The following people were involved in the research, writing, and internal review of this EIS. Individuals and organizations identified by an asterisk (*) were involved in preparation of the draft (not final) EIS.

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Edward Pettit	MEPA Compliance
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Seth Brandenberger	Shoreline Erosion/Agricultural Impacts
Sonja Hoeglund	GIS Applications/Vegetation Impacts
Chuck Dalby	Water Quality (sections 4.24.1.7, 4.24.2.7, 4.25.2, and 4.25.3)
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CHAPTER 7

GLOSSARY OF TERMS

100-year flood: The 100-year flood is a flood event that has a one-in-100 chance of being equaled or exceeded in any year.

abutment: The point of contact between a spillway wall or dam embankment and a natural slope.

acre-foot: The volume of water that would cover an area equivalent to 1 acre, 1 foot deep or 43,560 cubic feet (325,851 gallons).

aggregate: Sand and gravel materials used to make concrete or roller-compacted concrete or used to surface roads.

alluvial: Pertaining to material or processes associated with transportation or deposition by running water.

alluvial valley floor: (Legal definition) The unconsolidated stream-laid deposits holding streams where water availability is sufficient for subirrigation or flood irrigation agricultural activities; but the term does not include upland areas which are generally overlain by a thin veneer of colluvial deposits composed chiefly of debris from sheet erosion, deposits by unconcentrated runoff or slope wash, together with talus, other mass movement accumulation, and windblown deposits. (Common definition) The floor of a river valley.

ambient: The existing atmosphere or environment.

anchor ice: Ice that forms in the bottom of rivers when the rest of the water is not frozen.

aquatic biota: Lifeforms that live in water.

aquatic habitat: The place or type of site within which water-dependent plants or animals normally live.

aquifer: A water-bearing layer of permeable rock, sand, or gravel.

attenuate: To lessen the force or value; to reduce severity.

auxiliary outlet works: A second outlet works that can be used to back-up or supplement the primary outlet works.

baghouse: An air pollution abatement device used to trap particulates by filtering gas streams through large fabric bags, usually made of glass fibers.

batching: Process of mixing aggregate, water, and cement to make concrete.

benchmark: A relatively permanent object bearing a marked point of elevation.

benthic: Occurring at the bottom of a body of water.

berm: A narrow shelf or ledge, typically at the top or bottom of a slope.

biomass: The amount of living matter (as in a unit of area or volume of habitat).

black water: Water containing sanitary wastes from toilets.

borrow source: An excavated area where material may be mined/removed for use as fill at another location.

breach: A break in a dam embankment created by erosion of the embankment materials or by excavation to remove a portion of a dam. A catastrophic breach would be due to dam failure and would release the entire storage content of the reservoir in a brief period. A controlled breach would drain the reservoir to reduce the storage content over an extended period.

bulkhead: A structure or partition to resist pressure; a wall.

cfs: Measure of water flow rate in cubic feet per second. One cfs is equal to about 450 gallons per minute.

capillary movement: A movement of water caused by adhesion, cohesion, and surface tension of liquid in contact with a solid.

cavitation: A hydraulic condition where a vacuum forms and results in pitting damage to exposed surfaces.

chute: The face or channel of a dam's spillway.

coffer dam: A temporary dam designed to contain and divert water away from a dam, spillway, or other structure during construction.

contiguous: Touching along a boundary, being adjacent to.

crest: The top of a dam's spillway or dam itself.

cubic yard: Volume measurement used in construction equal to a 3-foot cube or 27 cubic feet or 202 gallons.

cumulative effects: A general estimation of the effects of project impacts in combination with other past, present, and reasonably foreseeable future projects or activities.

cutoff wall: An impervious structure constructed under dams and spillways to prevent seepage and possible dam failure.

dBA: A unit of sound measurement. Decibels in the A-weighted scale.

decreed water rights: Water rights established by court decree.

demographics: Statistics having to do with the study of human population (e.g., size, density, vital statistics.)

diatom: A class of minute, blanktonic, one-celled or colonial algae.

drawdown: Lowering of reservoir elevation when releases exceed inflow.

ecosystem: The complex of a community and its environment functioning as a unit of nature.

emergency spillway: A spillway structure used to pass infrequent or large flows. Earth-lined emergency spillways may suffer damage from use.

endangered species: A wildlife species that is listed by the U.S. Fish and Wildlife Service as being in danger of extinction throughout all or a significant portion of its range.

enhancement: For purposes of this EIS, enhancement is a program of activities to increase the value of fish and wildlife habitat.

equilibrium: A state of balance between two opposing forces.

ethnobotanical resources: Plants that have a special cultural or spiritual purpose.

eutrophication: The process whereby a body of water becomes highly (biologically) productive due to the input of large quantities of nutrients. Algae blooms often result, thus depleting the water of oxygen.

exchange water: Water made available to the Northern Cheyenne Tribe from Tongue River direct flow or from Tongue River Reservoir storage in exchange for Tribal return flows made available to other Tongue River water users.

fauna: Animals.

fen: Low land covered wholly or partly with water.

fish passage: Conditions that allow fish to migrate around hydraulic structures.

floodplain: Land that may be submerged by floodwaters; a plain built up by stream deposition.

flora: Plants.

firm annual yield: An estimate of the amount of water that can be supplied by a reservoir during the driest of years.

flume: An inclined channel for conveying water.

fluvial: Of or relating to a stream or river.

freeboard: Space between water surface elevation and dam crest.

freeze-thaw: Expansion and contraction action resulting from alternating freezing and thawing.

full pool: Reservoir at spillway crest elevation.

gaseous pollutants: Air pollutants in the form of gas such as sulfur dioxide, nitrogen dioxide, or carbon monoxide.

gate house: A structure on top of a gate shaft that houses gate controls.

geologic stratigraphy: The grouping of rocks by description, composition, and sequence of deposition.

geomorphology: Science dealing with landform evolution; the erosion and build-up of erosional materials on the earth's surface.

geotechnical: The structural limitations and engineering properties of geologic materials.

gondola car: A railroad freight car with sides and an open top used to haul coal, aggregate, and riprap.

gray water: Drain water from sinks and wash rooms.

herbaceous: A plant having little or no woody tissue and living for a single growing season.

high hazard: A dam whose failure would result in the loss of life; not a statement of condition.

historic: Significant in history.

horizonation: A distinct layer of soil, approximately parallel to the land surface, and differing from adjacent related soil layers in physical, chemical, and biological properties or characteristics.

hydrogeologic unit: A water-bearing subsurface layer or rock group.

hydrophytes: A plant growing in water or in soil too waterlogged for most plants to survive.

incremental increase: For purposes of this project, an incremental increase is a comparison of downstream flood elevations from a flood event versus downstream flood elevations from the flood event and dam break.

inflows: Water flowing into a reservoir.

intake structure: The structure in a reservoir that delivers water to the low level outlet conduit.

inundate: To cover with water, to flood.

invader species: Unwanted plant species (usually weeds) that encroach on the habitat of more desirable plant species.

invert: Lowest point or bottom of a stream channel, culvert, or tunnel.

irreversible effects: Those permanent, project-related changes that can not be reversed or restored to original conditions.

labyrinth weir: A spillway crest resembling a zigzag pattern and having a high efficiency.

lek: An assembly area where grouse carry on display or courtship behavior.

lithic: Relating to or made of stone.

local hire: Someone, not already an employee of the contractor or its subcontractors, who would normally be hired from the local labor force to perform work on the Tongue River Dam Project.

local workforce: All employees and subcontractors of the contractor and its subcontractors, including the core crew, if any, working on the Tongue River Dam Project on or near the Dam. The term does not include home office or other personnel working for a contractor on the Tongue River Dam if those personnel do not perform work within the Sate of Montana.

low level outlet works: Conduit and gate structure through a dam which allows periodic, controlled releases from a reservoir.

macroinvertebrate: Small animals that lack a spinal column.

median: Being in the middle, intermediate between a high and low.

mitigation: Measure taken to lessen an impact.

mixing heights: Above-ground elevation where all air quality constituents are thoroughly mixed.

morphology: The study of the form and external structure of rocks in relation to the development of erosional forms of topographic features.

neotropical migrant: Birds that migrate to and from the biogeographic region that includes South America, the West Indies, and tropical North America.

off-stream storage: Storage project located off a major stream course and filled using diverted water.

outflow: Releases from a project made through the outlet works or spillway.

oxbows: (Common definition) Meandering bends in a river which form a crescent shape.

particulate emissions: Finely divided solid or liquid particles discharged into the air in the form of dust, smoke, fumes, mist, spray, or fog.

peak flood flow: Maximum flow experienced during the rise and fall of a flood.

percolate: To ooze or trickle through a permeable substance.

periphyton: Organisms (as some algae) that live attached to underwater surfaces.

prehistoric: Existing in times predating written history.

primary gate: Gate in the outlet works of a dam used to make normal releases.

ppm: A measure of concentrations expressed in units of per million units of water.

probable maximum flood: The maximum runoff condition resulting from the most severe combination of hydrologic and meteorologic conditions that are considered reasonably possible for the drainage basin under study.

probable maximum precipitation: The largest possible precipitation event expected in an area based on the most severe combination of meteorologic conditions that are considered reasonably possible for the drainage basin under study.

project takeline: Boundary required to encompass the new reservoir area often referred to as the new high water mark.

pug mill: A concrete batching machine that allows continuous mixing of concrete materials.

railroad spur: A short track leaving the mainline and normally used to load or assemble rail cars.

reclamation: Restoring an area to a biologically productive condition.

recurrence interval: The average number of years between events of a given magnitude. For example a 50-year flood would have a normal probability of occurring once every 50 years.

reservoir margin: The area around the reservoir exposed between the high and low water marks.

riparian habitat: Habitat influenced by the presence of a stream, river, or reservoir and typically situated on the banks of such a body of water.

riprap: A layer of broken rock, cobbles, boulders, or fragments of sufficient size and thickness to resist the erosive forces of flowing or moving water.

roller-compacted concrete (RCC): A concrete mix used to construct gravity dams, placed with conveyors and/or heavy equipment, and compacted with large vibratory rollers.

rookery: The nesting or breeding grounds of a colony of birds.

run-of-river release: A reservoir operation where stream inflows equal reservoir releases.

scarifying: Loosening of compacted soil surface by mechanical means in preparation for seeding.

scoria: A light-weight aggregate. Baked and fused rock resulting from in-place burning of coal deposits.

secondary gate: Gate in the outlet works of a dam reserved for emergency operation or used during maintenance of the primary gate.

sediment trap: Condition created when flowing water carrying sediment enters a pool of still water.

settling pond: A quiet body of water used to remove suspended sediments.

sheet piling: Interlocking steel members driven into the ground to provide a seepage cutoff wall or structural support. Steel piling often is used to construct coffer dams.

siding: A short railroad track connected to the main track where unused railcars may be stored.

sill: A tabular body of igneous rock injected while molten parallel to bedding of intuded rock.

sloughing: To fall away from, as in soil falling off a side slope.

spillway: Structure used to discharge large quantities of water around the dam without damaging the dam.

spillway design flood: The peak flood flow used to size the maximum discharge capacity of a dam project.

stationary wave: Large wave created under rapid flow conditions by a change in the alignment of the side walls of the spillway chute.

stilling basin: An open structure or excavation at the foot of a chute or spillway to reduce the energy of the descending stream.

threatened species: A wildlife species that is federally listed because it is likely to become endangered in the near future.

turbidity: Condition of water carrying suspended sediment.

well points: Temporary well casings used with pumps to dewater soil and subsoil materials to allow construction activities.

wetlands: Lands that are generally covered by shallow water or where the ground water table is very close to the surface. In the context of this document, wetlands are generally defined as marshland and riparian habitat.

CHAPTER 8

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CHAPTER 9
COMMENTS & RESPONSES

9.1 WRITTEN COMMENTS AND RESPONSES

Comment Number

RECEIVED
JUL 1 1995

June 29, 1995

Edward M. Pettit, Environmental Coordinator
Montana Department of Natural Resources and Conservation
P. O. Box 202301
Helena, MT 59620-2301

Dear Mr. Pettit:

1 Pursuant to the Tongue River Basin Project Draft E.I.S., road access to private land, leased land, State and Federal land, and the cabin sites on the East side of Tongue River Reservoir is currently through the existing spillway and across the dam embankment. The Preferred Alternative (RCC) indicated that the reconstruction will significantly inhibit this access, both temporarily and possibly permanently. It appears that the project impacts and associated mitigation measures relating to access to these areas have not been addressed in the Draft. The Final E.I.S. needs to address these impacts and provide mitigation measures, both during construction and upon completion of the project. Failure to provide alternative road access routes will result in severe impacts to private landowners, leasees, outfitters, recreationists, and cabin owners.

Thank you for the opportunity to comment and your consideration.

Sincerely,

JT Richer

J T Richer

1 *As indicated in **Figure 3-6 of the EIS**, an estimated average of 10 vehicles daily used the road across the dam (when water levels permitted) to the East Shore Road during 1993, and similar vehicle access needs would be expected during and after dam rehabilitation.*

*Following the estimated 18-month dam rehabilitation period (during 1997 and 1998), full vehicle access would be available across the bridge that will be built as part of the project (**see Figure 2-8**). This bridge would be the primary access route to the East Shore Road under both Alternative 1 -(labyrinth weir) and 2 -(Roller-Compacted Concrete). Access across the dam crest could still be available after construction but would be blocked by major floods. Although not described in the draft EIS, small portions of the East Shore Road would be relocated to avoid being flooded by the project's higher reservoir water levels.*

*During the estimated 18 months of construction-related activities, access to the East Shore Road through the dam construction area would generally be obstructed. In order to provide partial access to the east side during construction, the project sponsors will implement the following mitigation as additional transportation mitigation to those listed in **Section 2.3.9.12 of the EIS**:*

> *The project sponsors will require the dam construction contractor (through the contact bid specifications) to put up signs, and provide local notification of the times when vehicles can travel across the dam to the East Shore Road. For example, these travel periods could be scheduled every other weekend from Friday evening (6 p.m.) to Monday dawn (6 a.m.). Vehicle access also would be provided across the construction area when construction activities are shut down for the winter. Under extraordinary circumstances, the construction contractor could allow exceptions to this schedule.*

This would not provide full unobstructed public access during the 18 months of construction and would cause traveler inconveniences.

Comment Number

July 7, 1995

RECEIVED
JUL 10 1995
DNRC

Edward M. Pettit, Environmental Coordinator
Montana Department of Natural Resources and Conservation
P.O. Box 202301
Helena, MT 59620-2301

Dear Mr. Pettit:

2 Pursuant to the Tongue River Basin Project Draft E.I.S., road access to private land, leased land, State and Federal land, and the cabin sites on the East side of Tongue River Reservoir is currently through the existing spillway and across the dam embankment. The Preferred Alternative (RCC) indicated that the reconstruction will significantly inhibit this access, both temporarily and possibly permanently. It appears that the project impacts and associated mitigation measures relating to access to these areas have not been adequately addressed in the Draft. The Final E.I.S. needs to address these impacts and provide mitigation measures, both during construction and upon completion of the project. Failure to provide alternative road access routes will result in severe impacts to private landowners, lessees, outfitters, recreationalists, and cabin owners.

Thank you for the opportunity to comment and your consideration.

Sincerely,
Diana L. Wright

2 *See response to Comment number 1.*

Comment Number

July 7, 1995

Edward M. Pettit, Environmental Coordinator
Montana Department of Natural Resources and Conservation
P.O. Box 202301
Helena, MT 59620-2301

Dear Mr. Pettit:

3 Pursuant to the Tongue River Basin Project Draft E.I.S., road access to private land, leased land, State and Federal land, and the cabin sites on the East side of Tongue River Reservoir is currently through the existing spillway and across the dam embankment. The Preferred Alternative (RCC) indicated that the reconstruction will significantly inhibit this access, both temporarily and possibly permanently. It appears that the project impacts and associated mitigation measures relating to access to these areas have not been adequately addressed in the Draft. The Final E.I.S. needs to address these impacts and provide mitigation measures, both during construction and upon completion of the project. Failure to provide alternative road access routes will result in severe impacts to private landowners, lessees, outfitters, recreationalists, and cabin owners.

Thank you for the opportunity to comment and your consideration.

Sincerely,

Ken Decker

KEN DECKER

3 *See response to Comment number 1.*

Comment Number

July 7, 1995

Edward M. Pettit, Environmental Coordinator
Montana Department of Natural Resources and Conservation
P.O. Box 202301
Helena, MT 59620-2301

Dear Mr. Pettit:

4 Pursuant to the Tongue River Basin Project Draft E.I.S., road access to private land, leased land, State and Federal land, and the cabin sites on the East side of Tongue River Reservoir is currently through the existing spillway and across the dam embankment. The Preferred Alternative (RCC) indicated that the reconstruction will significantly inhibit this access, both temporarily and possibly permanently. It appears that the project impacts and associated mitigation measures relating to access to these areas have not been adequately addressed in the Draft. The Final E.I.S. needs to address these impacts and provide mitigation measures, both during construction and upon completion of the project. Failure to provide alternative road access routes will result in severe impacts to private landowners, lessees, outfitters, recreationalists, and cabin owners.

Thank you for the opportunity to comment and your consideration.

Sincerely,

William H. [illegible]

---

4 *See response to Comment number 1.*

July 7, 1995

Edward M. Pettit, Environmental Coordinator
Montana Department of Natural Resources and Conservation
P.O. Box 202301
Helena, MT 59620-2301

Dear Mr. Pettit:

5 Pursuant to the Tongue River Basin Project Draft E.I.S., road access to private land, leased land, State and Federal land, and the cabin sites on the East side of Tongue River Reservoir is currently through the existing spillway and across the dam embankment. The Preferred Alternative (RCC) indicated that the reconstruction will significantly inhibit this access, both temporarily and possibly permanently. It appears that the project impacts and associated mitigation measures relating to access to these areas have not been adequately addressed in the Draft. The Final E.I.S. needs to address these impacts and provide mitigation measures, both during construction and upon completion of the project. Failure to provide alternative road access routes will result in severe impacts to private landowners, lessees, outfitters, recreationalists, and cabin owners.

Thank you for the opportunity to comment and your consideration.

Sincerely,

5 *See response to Comment number 1.*

Comment Number

July 10, 1995

Edward M. Pettit, Environmental Coordinator
Montana Department of Natural Resources and Conservation
P.O. Box 202301
Helena, MT 59620-2301

RE: Tongue River Basin Project
Access Across the Dam

Dear Mr. Pettit:

6 I am writing this letter regards to the Tongue River Reservoir Project. I am concerned about access across the new dam to property owners, lease holders and the cabin sites. Early on in the project, mention was made of bridges or simply driving across the spillway. Today, however, nothing positive has been mentioned in regards to this. Land on the east side of the lake has been accessed across the spillway since its inception. I am very concerned about how access will be provided in the future. Will the final E.I.S. address access? If you have any new information regarding this could you please forward it to my address.

Sincerely,
Bill
Bill Rawlings

BR/dlw

CARROLL REALTY CO., INC.
306 N. Main, Box 665
Sheridan, Wyoming 82801
307-672-8911

Each office independently owned and operated

6 *See response to Comment number 1.*

Comment Number

RECEIVED
JUL 14 1995
DNRC

June 29, 1995

Edward M. Pettit, Environmental Coordinator
Montana Department of Natural Resources and Conservation
P. O. Box 202301
Helena, MT 59620-2301

Dear Mr. Pettit:

7 Pursuant to the Tongue River Basin Project Draft E.I.S., road access to private land, leased land, State and Federal land, and the cabin sites on the East side of Tongue River Reservoir is currently through the existing spillway and across the dam embankment. The Preferred Alternative (RCC) indicated that the reconstruction will significantly inhibit this access, both temporarily and possibly permanently. It appears that the project impacts and associated mitigation measures relating to access to these areas have not been addressed in the Draft. The Final E.I.S. needs to address these impacts and provide mitigation measures, both during construction and upon completion of the project. Failure to provide alternative road access routes will result in severe impacts to private landowners, leasees, outfitters, recreationists, and cabin owners.

Thank you for the opportunity to comment and your consideration.

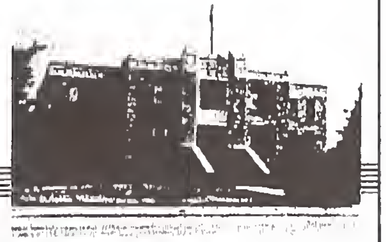
Sincerely,

J T Richer and Virgil + Millie Boardman
1472 Warren Ave.
Sheridan, Wyo.
82801

7 *See response to Comment number 1.*

Comment Number

BIG HORN COUNTY



BOARD OF COMMISSIONERS HARDIN, MONTANA 59034
DRAWER H
(406) 665-3520

July 11, 1995

State of Montana
Department of Natural Resources
and Conservation
P.O. Box 202301
Helena, MT 59620-2301

ATTN: Edward Pettit

RE: Tongue River Dam Reconstruction

Dear Mr. Pettit:

Big Horn County would like to present our written comments indicating our concerns for the deteriorating condition of Montana Highway 314 and the proposed relocation of County Road No. 380 - Tongue River Road.

8 Because of the deteriorating road condition, we are planning to implement a 350 lb. per inch weight limit restriction on Highway 314. In addition, we will be maintaining our 35 MPH speed limit restriction for obvious safety reasons. Should the road conditions improve we will be lifting the 35 MPH speed limit.

We know this will be an inconvenience to the construction project but we feel that we have no other alternatives.

9 The relocation of County Road No. 380 would require the county to proceed with the abandonment and relocation of this road pursuant to Section 7-14-2601 to 7-14-2615, M.C.A. (1993). We are going on record informing the DNRC that said relocation will be at their expense and must be constructed to MDT Road Standards.

Should you have any further questions, please advise.

Very truly yours,

BOARD OF COMMISSIONERS
BIG HORN COUNTY, MONTANA

Debra Johnson
Debra Johnson
Chairman

John Doyle
Member

Robert Koyama
Robert Koyama
Member

---

8 *Vehicles used in dam rehabilitation would increase total Highway 314 traffic from a present average of 280 to 610 vehicles per day during project activity, and would increase the truck numbers from 28 to 80 trucks daily (a 180 percent increase) during the 18 months of rehabilitation. The project sponsors will require that construction trucks comply with posted weight restrictions or seek overweight authorizations from the Bighorn County Sheriff for loads exceeding county weight limits.*

9 *The project sponsors recognize that the cost of upgrading and relocating County Road No. 380 is a project expense. The road improvement portion of the project is currently under preliminary design to increase its top-width to 24 feet, decrease grades to 8 percent and under, and to maintain minimum radii of curvature of 400 feet (with some exceptions).*

Comment Number

July 20.1995

Public Hearing on the

TONGUE RIVER BASIN PROJECT
ENVIRONMENTAL IMPACT STATMENT

Held at Miles City Community College
July 20th. , 5:30 P. M.

Chairman:

After Studying the draft EIS I present the following comments.

10 1. I was unable to find an outline of the proposed procedure for delivery and distribution of the water to the users for Irrigation purposes.

11 2I find no reference to an adjudication of water rights pursuant to the fact information supplied by users following a request for information by the water dept.

12 3I find evidence of some very costly choices in the re-design of the dam rehabilitation project. Improvment could be made in the managment and operation at considerable cost saving.

COMMENTS:

13 1. Being personnaly familiar with start up and following history of the original project. I find it important to make use of the problems that arose from the original system. The users rejected co-operation with the system. A majority ceased payment on the contracts. Attempts to organize the system were ig nored. A plan should be publicized.

14 Adjudication of water rights is an essential step in the plan to have a succesful operation particularly for the irrigating farmers. Extensive development and use of water for irrigation has occured since the original adjudication.

15 3.I beleive the plan to raise the spillway crest 4 feet increases the HIGH HAZARD classifaction of the dam.

16 Instead I think the permenant level of the spillway be lowered 2 feet and a slide gate system implemented. That would raise the storage height by 6 feet above the revised level. Such a system would consist of a series of metal frameed grooves for the insertion of simple wood planks which could be controlled from a walk way above the crestline of the dam. I have observed this system on other dams in the state. The capacity of the spillway would probably increased to 100,000 cu.ft.per second The labyrinth design allows no flexability to vary the silling of unusual water circumstances.

Very Sincerely Yours,

Hugo Muggli

Hugo Muggli
Tongue River RT.
Miles City MT. 59301

10 *Postconstruction reservoir operations are discussed in **Section 4.7.1.1 of the EIS**. The final reservoir operations plan at Tongue River Reservoir will be established by a five-member advisory committee consisting of representatives from Montana state government, the Tongue River Water Users Association, the Northern Cheyenne Tribe, the United States, and a fifth member to be selected by the other four. The specifics of the plan will be determined after establishment of the advisory committee.*

11 *The general statewide adjudication of water rights in Montana is the sole responsibility of the State Water Court, which is not a state government agency. Although DNRC is assisting the Water Court in its efforts to complete the adjudication, DNRC has no control over the order in which specific basins are considered. Any questions about the statewide adjudication should be directed to the Water Court.*

12 *The alternatives considered in the **Tongue River Basin Project Draft Environmental Impact Statement** (draft EIS) and carried forward for continued analysis in the **Tongue River Basin Project Final Environmental Impact Statement** (final EIS) represent realistic, technologically feasible alternatives that bear a logical relationship to the proposal being evaluated. The present spillway is undersized and unsafe and requires replacement under the Montana Dam Safety Act. Revised management and operation of the existing spillway would not remedy the dam safety deficiencies at Tongue River Dam. Certainly, cost effectiveness was one of the project sponsors' primary considerations when evaluating alternatives. The project sponsors maintain that the alternatives considered in the draft and final EIS are the most economically feasible means of achieving the project goals.*

13 *As indicated in the **response to Comment number 10**, postconstruction reservoir operations will be established and directed by a five-member advisory committee that will include a representative of the Tongue River Water Users Association. The Tongue River Water Users Association thus will have direct input into whatever plan is developed.*

14 ***See response to Comment number 11.***

15 *Raising the spillway crest has no effect on the hazard classification of the dam. Under the Montana Dam Safety Act and Administrative Rules, dams are either high-hazard, or they are not. Even a perfectly safe dam can be classified as "high hazard." The "high hazard" classification means that if the dam did fail, life could be lost downstream.* ***See Section 2.3.20 of the EIS*** *for additional information regarding the classification of Tongue River Dam.*

16 *Lowering the crest and adding stop logs is not a practical solution at Tongue River Dam. It would be if the existing spillway were performing well hydraulically and was not structurally deficient, but because the dam needs major modifications to alter the spillway hydraulics anyway, it will be less costly and safer to simply raise the spillway crest.*

The existing spillway is not capable hydraulically of handling the design flow of 100,000 cfs. The spillway narrows from 350 feet at the crest (top) to less than 100 feet at the tail (lower end). Flow over the spillway cannot converge to this extent, creating a turbulent flow that is destructive to the spillway in several ways. A new spillway configuration is needed. Solving the convergence problem requires either widening the tail or reducing the crest. Widening the tail would require considerable excavation because of the high walls of earth on both sides of the spillway. This option was explored in a June 4, 1985 report by Harlan, Miller, Tait, titled "Engineering Feasibility Study, Tongue River Spillway Modification." Widening the spillway tail adequately would require excavation of over 300,000 cubic-yards of soil and rock, which makes it unpractical. To reduce the amount of tail width required, the labyrinth weir alternative was developed. This alternative allows the maximum amount of crest width in the minimum amount of space.

The other solution for the convergence problems is to narrow the crest. If the crest width is reduced, its capacity is reduced. For instance, if a crest width of 200 feet is hydraulically suitable for a taper to 100 feet, the capacity of the spillway is reduced to about 57,000 cfs. To accommodate 100,000 cfs the spillway crest would need to be lowered 8 feet, and the height of stoplogs would, therefore, need to be 4 feet higher than that, or 12 feet. Stoplogs are notorious for becoming semipermanent after installation, and the reliability of being able to remove them during high flows is not good, especially if they have 12-feet of water against them. For instance, at Holter Dam this past year a large crane had to be brought in to remove a row of stop logs, even though a hand winch was available on an overhead walkway, similar to that described in this comment. The RCC alternative was developed to allow the crest to be shortened to an appropriate width by providing an auxiliary spillway over the dam.

Comment Number

United States Department of the Interior

FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
100 NORTH PARK, SUITE 320
HELENA MT 59601

RECEIVED
JUL 24 1995
DNRC

IN REPLY REFER TO:
ES-61130-Billings
M.04-BR Tongue River

July 20, 1995

Mr. Edward M. Pettit
Environmental Coordinator
Department of Natural
Resources and Conservation
P.O. Box 202301
Helena, Montana 59620-2301

Dear Mr. Pettit:

17 We have received your June 2 letter and copy of the Tongue River Basin Project Draft Environmental Impact Statement (DEIS). We have reviewed the DEIS and believe it adequately addresses the environmental issues. If the mitigation and enhancement measures addressed in the document are implemented, we believe there will be no long term impacts to fish and wildlife resources.

18 We have also reviewed the draft Biological Assessment (appendix B-1) and concur with the determination that the proposed project is not likely to adversely affect any of the threatened or endangered species.

If you have any questions regarding this letter, please contact Steve Oddan of my staff at 247-7366.

Sincerely,

for Kemper M. McMaster
Field Supervisor
Montana Field Office

STO/jf

cc: Mark Albers, Montana Area Office, Bureau of Reclamation, Billings, MT
Suboffice Coordinator, Ecological Services (Billings, MT)

17 *Comment noted.*

18 *Comment noted.*

Comment Number

RECEIVED
JUL 25 1995
DNRC

THE SETTLEMENT COMPACT WITH THE CHEYENNE DISCUSSES THE BOARD WHICH WILL RUN THE DAM AFTER CONSTRUCTION. I DON'T RECALL ALL OF THE MEMBERS BUT IT SEEMS THAT ONE MEMBER WAS

19 THE TONGUE RIVER WATER USER PRESIDENT, ONE WAS A CHEYENNE MEMBER AND ONE WAS A FISH AND GAME MEMBER AND ANOTHER MEMBER WAS CHOSEN BY THESE. I THINK THIS INFORMATION SHOULD BE INCLUDED IN THE E.I.S.

20 I ALSO FEEL THAT EACH OF THESE MEMBERS SHOULD PARTICIPATE IN PAYING FOR MAINTENANCE OF THE NEW DAM SINCE THEY HAVE EQUAL SAY IN RUNNING OF THE DAM. THE MEMBER WHO IS CHOSEN SHOULD BE EXEMPT BUT ALL OTHER MEMBERS SHOULD PARTICIPATE EQUALLY. THE FEES MAY BE LEVIED ACCORDING TO AMOUNT OF WATER RIGHTS HELD BY EACH.

21 FIGURE 2-5 AND 2-17 SHOW PROPOSED HOISTING EQUIPMENT. I BELIEVE THE HYDRAULIC CYLINDER SHOULD BE THE PREFERED METHOD OVER THE WIRE ROPE HOIST SO THAT PRESSURE CAN BE APPLIED DOWN AS WELL AS UP, IF REQUIRED.

19 ***See response to Comment number 10.***

20 *Operation and maintenance costs at Tongue River Dam are unrelated to membership on the advisory committee that will be chartered to oversee operation of the dam. Following rehabilitation of the project, operation and maintenance fees will be collected in the same fashion as they currently are; fees will be set annually and everyone who contracts for Tongue River Reservoir water will pay for operation and maintenance on a per acre-foot basis.*

21 *It is possible to design a wire rope system that can apply pressure down as well as up. It is even possible to design a gravity gate that is pushed down by water pressure and flow. Therefore, these options will be considered during final design along with the hydraulic gate operators.*

Comment Number

22 I THINK A FIGURE SIMILAR TO FIGURE 2-16 SHOULD BE ADDED TO THE LABYRINTH WEIR SECTION TO HELP CLARIFY WHAT THE WEIR REALLY LOOKS LIKE. THE PLAN VIEW IN FIGURE 2-1 DOESN'T ADEQUATELY PORTRAY THE WEIR.

23 I AGREE THAT THE RCC SPILLWAY SHOULD BE THE PREFERRED ALTERNATIVE. IT WOULD MAINTAIN STREAM FLOW CLOSER TO THAT SEEN NOW.

24 THE INCREASED FLOWS WITH THE WEIR DESIGN COULD CAUSE MORE DOWNSTREAM FLOODING AND COULD POSSIBLY DAMAGE MY BRIDGE ACROSS THE TONGUE RIVER.

MARK FIX
Thank 7's
HC 32 BOX 4196
MILES CITY, MT 59301

22 *This figure has been added to the final EIS as **Figure 2-2**.*

23 *Comment noted.*

24 *You are correct in your assessment of the impacts to downstream flood flows associated with implementation of the labyrinth weir spillway design. DNRC's floodplain management section indicates that the impacts to the 100-year floodplain downstream of Tongue River Dam would be significantly less under the RCC alternative than under the labyrinth weir alternative. However, the possibility for damage to your bridge is far greater with no rehabilitation of Tongue River Dam than under either construction alternative.*

Comment Number

CARROLL INSURANCE INC.

306 N. MAIN, P.O. BOX 665, SHERIDAN, WY 82801 • 307-672-8911

RECEIVED
JUL 25 1995
DNRC

EDWARD M. PETTIT
ENVIRONMENTAL COORDINATOR
MONTANA DEPARTMENT OF
NATURAL RESOURCES & CONSERVATION
PO Box 202301
Helena, MT 59620-2301

July 21, 1995

RE: Tongue River Basin Project

Dear Mr. Pettit,

Upon review of the draft E.I.S. for the Tongue River Basin Project, page 2-16, it states that "Access for private cabin owners on the east side of the reservoir who normally use the dam crest would not be provided during construction". Also on page 3-34, the draft states that traffic on the east roadway is estimated to be less than 10 vehicles per day with almost no large truck traffic.

25 The road, I agree is used on a limited basis, which I must say would always be less than 10 vehicles per day and maybe more like 10 vehicles per month. This road is so very important to the few that use the road that it be of utmost importance to allow the selected few, access to the east shore during construction. I think the people that should be allowed access are the 9 cabin owners, ranchers and land owners, that have a vested interest that need to have access. I see no reason why the access should be open to the public that think they have to go over on the east side to view what is over there.

25 *See response to Comment number 1.*

26 I realize that safety is of the utmost importance during the construction period, and there may be a period of time that the selected few may not be allowed access, for a period of a day or a few days. Since there are only a few that need access, I would think we could be allowed access.

26 *See response to Comment number 1.*

27 It is also my understanding that no arrangements have been made for access to the cabins on lands on the east side via the road or trail, which ever you may want to call it, from the east Decker mine. I have been over this road, which crosses mine property, two or three private land owners land and this is an acceptable, alternative, emergency route on a limited bases. I think, with the help of the State of Montana, that an arrangement may be made with the mine. I do not think we should have any problems with the landowners, but communication with the mine may be another problem.

27 *See response to Comment number 1.*

In summary, what I am asking for is access to the cabins, however it can be done, to the cabins on a selected basis, during the construction period.

Comment Number

28 In reference to Section 4.15.1.1 page 4-49, it states that only one area of east shore road would be inundated by the higher water elevations. I would assume that this one area refers to the road that is near the mouth of the first bay directly south of the dam itself. I know elevation survey has been taken at the mouth of the second bay south of the dam, which is the bay that the cabins are located on. I do not know the elevation of the dam which the road crosses in the second bay, but I am aware that there has been water in the crossing previously when water has been running over the spillway. I think something should be addressed about the second location. I am very interested in learning what and if any plans are for the relocation and rehabilitation of the east side road, either partially or in its entirety.

29 Referring to Section 4.7.1.2 page 4-16, Reservoir Ice, I think this issue was properly addressed on a positive note and it is very fesible to retain a level of the water during the winter months, without a reduction or increase in levels which fluctuate the ice and creates a dangerous ice conditions, which could cause loss of life.

30 Figure 2-12 page 2-36, indicates that proposed is boat slips along with a new 24 foot wide ramp with dock. My question is, how many boat slips are proposed and what will be the control or policing of the usage of these slips? It is of concern to me that the slips will be occupied by the Marina operators and not for the use of the public.

31 On page 3-39 it states, about five privately operated boat slips are at the Marine and available for Marina-related activities. I have not seen these slips in all my years at the Marina and Tongue River, other than a floating dock at the gas pump, which the curretn Marina operator parks small fishing boats at, and is virtually impossible to get a larger boat into the shallow water to obtain gas.

32 There is a larger dock which is floated by barrels that is near the loading area, but this is usually sitting on dry ground and useless. I would like very much to see some slips, with docks, that are situated in a area dug out so it is deep enough to handle larger boats for the use of the public. It gets very expensive replacing or rebuilding props when coming or going away from shore, expecially when the boaters are fighting the wind.

33 I do not know where the new 24 foot ramp will be, but I think it would be wise to move the ramp more to the west of the current ramp. This may require some dredging of that bay.

34 What is meant by full service camp sites? Does this mean full water and electrical hookups? I am also concerned with the low lying area of Peewee Point to the exsisting roadway. With the increase of water level, this area when the water is at maximum level, it should be about one foot deep. It appears to me that this will create a mud bog and a mosquitoe invested area, which is so close to the public camping areas. What is being planned for this?

35 It is very encouraging to see that there are new proposed potable water facilities, new camp sites, new latrines, providing they are pumped and kept cleaned.

28 **See response to Comment number 1.**

29 *Under the scenarios presented in the draft EIS, reservoir elevations would gradually increase during the winter. Ice formation along the shorelines should keep up with the gradual rise in the reservoir. However, as on any body of water, fisherman will still need to take precautions when ice fishing on the Tongue River Reservoir. Ice can be particularly dangerous early in the season when there are still thin spots, and late in the season when ice begins to melt around the shoreline and open spots develop near the center of the reservoir.*

30 *Between 24 and 48 boat slips are being considered for the Campers Point area of Tongue River State Park. The final number of boat slips will be determined by Region 7 DFWP managers when they allocate enhancement funds among design options for the park. Use of the new boat slips would be allocated to marina operation and public use, and ultimately would be determined by DFWP through contract guidelines with the marina concessionaire. The list of State park improvements in Section 2.5.6 of the EIS has been expanded to include mention of these possible boat slips.*

31 *The five privately operated boat slips at the floating dock are available for marina-related activities and are not available to the public. Most large (18 to 20-foot) boats are able to obtain gas at the dock during the spring and summer. The current location of the fueling operation is not well suited for serving deeper draft boats when reservoir levels are low.*

32 *During final design for state park improvements, DFWP will determine the extent to which the mining of aggregate at Campers Point could provide a bay (when reservoir levels are high) with docks for boats. DFWP will attempt to place docks and boat slips in the best location available to minimize damage to boats and also to reduce the necessity for constantly moving facilities to accommodate fluctuating reservoir levels.*

33 *The proposed site for the new boat ramp is approximately 400 feet west of the current ramp. No dredging is currently proposed in the bay, and shallow water conditions would occur in dry years. Dirt fill would be used at the top of the new ramp to steepen the approach and maintain a uniform 12 to 16 percent grade for the entire length of the ramp.*

Comment Number

36 I would also like to address another concern, which is not mentioned in the EIS. With the development of the area as proposed, I am sure the day usage will increase, which means more water craft and personal watercraft(jet skis), and on a small body of water such as Tongue River Reservoir, this creates a mass of confusion at times. Currently there is s "no-wake area", at the boatramp, but nothing in the cabin area. I think this should be made a no wake area. The cabin owners have built there own docks, the area is occupied by children swimming, and the bay or cove is a dead end. I see no reason why this could not be dedicated a no-wake area. Some children have been nearly hit by speeding boats, either by people looking at the cabins and not paying attention where they are, or just showing off.

37 In reference to section 2.1 page 2-1, I am in agreement with the project sponsors, that the RCC spillway should be the preferred alternative. It definately makes sense economically, and from the esthetics of the ares. Both proposed alternatives will do the purpose of the project, but the RCC spillway will not alter the esthetics of the area.

38 There should then be no need for a bridge downstream, which would be costly. An access across the face of the spillway and dam could be built, without large expenditures, upkeep and will certainly be able to handle the traffic.

39 Overall, I think the project has been very well planned, and I am very anxious to see the project completed.

I would like to be included on future mailings. My name and address is: Larry R. Alden
830 S. Thurmond
Sheridan, WY 82801
307-674-8485 or 307-672-8911

Sincerely,

Larry R. Alden

Larry R. Alden

34 *A full service campsite has potable water and sewer and electrical hook-ups. Based on interim reservoir operations, portions of PeeWee Point and Sand Point would have shallow water during full pool and bare ground at lower reservoir elevations. In time, wave action would remove mud from these areas, leaving shoreline materials that would closely resemble those now present. Wave action along the new shoreline might lessen the potential for mosquitoes.*

35 *Comment noted.*

36 *DFWP has identified several problems related to user conflicts, loud jet skis, and safety concerns from congestion at Tongue River Reservoir, and will gather public input when determining management approaches. Options considered to address safety concerns at the reservoir and in the cabin area are the creation of additional no-wake zones, reservoir zoning of water-based activities, and increased safety patrols. DFWP will continue to gather public input on management options and plans to finalize the* ***Draft Tongue River Reservoir Recreation Management Plan*** *in 1996.*

37 *Comment noted.*

38 *Under either construction alternative, a bridge would be necessary for access to the gate house during flooding. Simple access across the face of the spillway (like that which exists currently) only provides access when flows permit. DNRC personnel need access to the gate house to control outflows through the low level outlet works. Such a bridge will allow more access to the east shore during low flood events (before the secondary spillway kicks in).*

39 *Comment noted.*

Comment Number

MUSGRAVE RANCH
P.O. BOX 32
DECKER, MONTANA 59025

July 26, 1995

Tongue River Basin Project DEIS Comments

1. Concerning livestock water availability in the Tongue River:

We have nearly always had open water through a large portion of our ranch in the winter because of warmer water coming out of the reservoir. The surface of the river past our ranch buildings has frozen in the winter for only very short periods of time or not at all. Since 1952, when the Musgrave family came to this ranch, we have depended on the Tongue River for stock water year around. The "Intent" of the Project sponsors to keep the river as it is now is admirable but will not water our cattle if changes occur.

40 What changes should we expect in regards to in-stream flow and surface freezes?

41 What do you recommend we do to prepare for these changes?

42 What will the "Project" do to mitigate these changes?

2. Concerning access to the east side of the Tongue River by crossing the dam:

During high water (such as the summer of 1995), for as long as two months or more, we have to trail our cattle across the existing dam for the purpose of pasture utilization as our land lies on both

40 *During construction, winter instream flows should be similar to existing conditions (please refer to **Appendix E of the EIS**).*

*Instream flows following construction will depend to a large extent on how much additional water is consumed by the Northern Cheyenne Tribe and the state of Wyoming. If the Tribe and Wyoming develop all water that is available to them through their respective compacts, it is likely that winter instream flows will be substantially less than previously. This is because (1) inflows to the reservoir will decrease if Wyoming develops additional water, and (2) more water will have to be stored in the reservoir during the winter so it can be released to supply all project contract needs later in the year. Instream flows under some possible Tribal and Wyoming development scenarios, and those that occurred previously, are presented in **Appendix E of the EIS**. If the Tribe and Wyoming do not develop substantially more water, it should be possible to maintain winter releases at levels similar to those that have occurred previously.*

Generally, flows following construction should be sufficient to maintain DFWP's instream flow right of 75 cfs. This flow represents a minimum winter flow that is considered necessary to maintain the river fishery. This flow also helps keep the river free of ice and allows for stock watering. This level of flow is maintained almost always in all of the scenarios presented in the EIS.

Even though the project sponsors do not anticipate significant changes in the downstream flow regime from that which has occurred previously, we do recognize that open water may not be available at times, during extreme events. Because, as you noted in your comment, such incidents have occurred in the past and can be considered part of the natural flow regime, the project sponsors see no need for mitigation. Regarding what you can do to prepare for such events, the project sponsors can only suggest that you continue whatever you have done in the past. If reservoir operation changes regularly affect your stock watering, then you could contact the reservoir operations advisory committee or the Northern Cheyenne-Montana Compact Board. The advisory committee will decide each year upon a reservoir operation schedule. The committee will have a representative from Montana state government, the Tongue River Water Users Association, the Northern Cheyenne Tribe, the United States, and a fifth member to be selected by the other four.

The Northern Cheyenne-Montana Compact Board will consist of three members: one appointed by the Governor, one by the Northern Cheyenne Tribal Council, and a third selected by the other two. The Board will have jurisdiction to resolve water right controversies between Tribal water users and state water rights holders.

Comment Number

sides of Tongue River. We also need to move cattle for branding, trailing to leased summer pasture, etc. In addition, we have had to cross the dam with haying equipment to reach our irrigated hay meadow and with a pickup or four-wheeler to scatter salt and mineral. On page 2-16, 2.3.1.6, of the Draft EIS,it states that access across the dam crest would not be provided during construction for cabin owners on the east side of the reservoir, and on page 4-56, 4.17.1 it states that livestock exclusion fencing is proposed on most DNRC lands . In addition, the preferred alternate (RCC) will put a concrete cap on the existing dam. A road or bridge that can be used by motorized vehicles may not necessarily be suitable for trailing livestock.

43 What should we expect in regards to access to the east side of the reservoir/river by crossing the dam both during and after construction?

44 What do you suggest we do to prepare for these changes?

45 What will the "Project" do to mitigate these changes?

3. Concerning irrigation water:

On page 2-31, 2.3.9.2, of the Draft EIS, the Project sponsors propose to "potentially compensate agricultural producers for a portion of incurred losses" by compensating water contract holders for non-delivered water at the "effective average water contract price for documented losses that could be directly attributed to the construction project". The cost of the water contract is minimal compared to the loss of hay production because irrigation water is not available. Pages 4-43 and 4-44, 4.14.1.2, recognize production loss but do not mention any compensation plan just in case the "intent" to maintain enough stream flow for irrigation is not a reality.

46 Will the "Project" make compensation for hay production loss due to lack of irrigation water?

p.2

41 ***See response to Comment number 40.***

42 ***See response to Comment number 40.***

43 ***See response to Comment number 1.*** *The bridge will be designed not only for vehicle access but also for moving livestock and farm equipment.*

44 ***See response to Comment number 1.*** *No change in access is expected. Cattle will cross the bridge instead of crossing the dam crest by the existing spillway. Except during high flows, the RCC overlay would not prohibit cattle from crossing.*

45 ***See response to Comment number 1.*** *The bridge described in the* ***response to Comment number 1*** *represents project-related mitigation.*

46 *Originally, the project sponsors proposed mitigating for lost crop production as described in your comment. In response to comments received on this proposal, the project sponsors agree to work with the Tongue River Water Users Association to develop an acceptable means of compensation. The agricultural mitigation plan presented in* ***Section 2.3.9.2 of the final EIS*** *has been changed to reflect the project sponsors' revised means of compensating for lost agricultural production attributable to the project.*

Comment Number

4. **Concerning Impact on the Musgrave Ranch during and after the construction phase:**

47 What do you recommend we do to prepare for increased road traffic up and down the Tongue River below the dam?

48 Who will be responsible for maintenance of the county roads that access the construction area?

49 What do you recommend we do to prepare for increased poaching and trespassing which may occur on our deeded land?

50 Does the "Project" have any plans to assist landowners with these problems?

51 We have suggested that signs be posted at the area below the dam that is a popular canoe launching site telling canoers that there is no public access to the river below that site and asking them to at least park on the county road and portage their canoes rather than driving closer to the river and parking on private land. Are such signs a possibility? We have found that many trespassers think any land that is unfenced is public property so perhaps a variety of well-placed signs would help.

52 We encourage the Project sponsors to "prohibit usage of the county road adjacent to the (eagle's) nest site for project-related traffic during the February 1 to August 15 period each year of construction", as suggested in the Draft EIS, Appendix B-22, Item 2.

William R. Musgrave

William R. Musgrave

Judith Ann Musgrave

Judith Ann Musgrave

p.3

47 *Traffic volumes north of the dam are not expected to increase significantly during rehabilitation of Tongue River Dam. It is expected that most commuting workers (including Northern Cheyenne) will use Highway 314. Any temporary increases will be monitored and the project sponsors will respond to any problems caused by project-related traffic. The estimated traffic on the Tongue River Road (Bighorn County Road 380) from Highway 314 to the Tongue River Dam was an average of 60 vehicles daily during 1993. There are no data regarding traffic levels on road sections north of the dam, but they are estimated to average less than 50 vehicles daily. Virtually all construction supplies and materials would come from Sheridan or locations south of the project area so construction activities would substantially increase vehicle traffic south of the dam (on County Road 380 - from the present 60 vehicles a day to an estimated 360 vehicles daily during construction), but would cause insignificant traffic increases north of the dam.*

Approximately 75 percent of the expected total project workforce of 26 workers (Alternative 1), or 16 workers (Alternative 2) are expected to be members of the Northern Cheyenne Tribe, so up to 20 workers might commute from north of the dam. In the unlikely event that all of these workers commuted from north of the dam, rehabilitation could generate up to 26 daily vehicle trips on Road 380 below the reservoir (from less than 50 vehicles daily at present to about 75 vehicles a day).

The project sponsors believe that it is more probable that Tribal workers would commute from multiple locations, making use of all three local access roads during the estimated 18 months of project rehabilitation. Therefore, the project sponsors believe that more accurate estimates of construction worker traffic (incorporating the effects of diverse worker residences, possible temporary worker camps on Tribal lands adjacent to the reservoir, and car pooling) would generate peak daily traffic increases of 16 vehicles (Alternative 1) or 12 vehicles (Alternative 2) below the dam. These temporary increases from present traffic levels of 50 vehicles a day are relatively insignificant and would have minor temporary impacts, being well within road design standards.

48 *Bighorn County would be responsible for postconstruction maintenance of County Road 380. During construction, the project sponsors will assume this responsibility. The proposed project includes widening, relocating, and an improved surface on approximately 7.5 miles of Bighorn County Road 380.*

Comment Number

*There would be noticeable traffic restrictions during road resurfacing and relocation (see transportation mitigations listed in **Section 2.3.9.12**). The project road management goal would be to generally leave this road in better condition than at present, and to have all road sections meet applicable road standards with minor exceptions.*

49 *Because access north of the dam is not being improved, the project sponsors do not anticipate increases in trespassing or poaching.*

50 ***See response to Comment number 49.***

51 *DFWP has indicated to the project sponsors that it will consider installing an information sign at the fishing access site below the dam following project construction. This sign could inform recreationists of public access points along the river, remind them of landowners' rights, and encourage courtesy toward these landowners.*

52 *Contracts for project construction would include a clause prohibiting construction traffic from using this county road during bald eagle nesting and rearing. This same clause also would encourage workers to avoid using this stretch of county road 380 while commuting to and from the project area.*

Comment Number

RECEIVED
AUG 0 1 1995
DNRC

July 31, 1995

Bob Miars
P.O. Box 234
2074 Vista
Colstrip, MT 59323

Dear Mr. Pettit,

I am writing to address some of my concerns over the Tongue River basin project. First, I should let you know that my family spends many days at the reservoir every year. We are avid fishermen and water enthusiasts. Also, being a native of this area, I have seen the changes take place through the last 30 plus years. Here are a few questions I have concerning the repair of the dam and spillway.

53 1). who will regulate the lake level and stream flow of the river? In the past this has been poorly controlled by the irrigators only.

54 2). Why has the state DNRC refused to let new cabin sites on the lake? Wouldn't this help ease overcrowding the camping sites?

55 3). When you were holding hearings why did you leave out the town of Colstrip? Almost 5000 people who live only 75 miles north of Tongue River Reservoir. I think if you would check with the dept. of Fish Wildlife and Parks they would tell you a good share of the fees collected at the lake come from the residents of Colstrip.

56 4). why should Wyoming residents have a say in how Montana rebuilds a dam? Also, is the access road to their cabins maintained by Montana taxpayers?

57 5). Why is the state giving land around the lake to the Northern Cheyenne tribe?

58 6). Why is information about exactly what is being planned not let out to the public via newspapers ect.? It's as if someone is trying to hide something.

I know this sounds like just so much whining, but these are concerns that not only I have but many of my friends and neighbors share as well. If you can shed some light on these topics I would be grateful. Also, I will share this information with other Colstrip residents who are frequent users of the Tongue River recreation area. Thanks for your time and trouble.

Yours truly,
Bob Miars

53 ***See responses to Comment numbers 10 and 19.***

54 *DNRC policy is not to lease additional cabin sites at the reservoir. It is likely that additional cabins around the reservoir would not relieve overcrowding, but would result in less DNRC land available for public use. Further crowding on roads, water, ramps, and other facilities also would occur if more cabins were present.*

55 *The public hearings on the Tongue River Basin Project draft EIS were held at Busby, Lame Deer, Muddy, Ashland, Birney Village, Miles City, and Billings, Montana, and Sheridan, Wyoming, during the week of July 17-21, 1995. The project sponsors anticipated that Colstrip residents could attend the Lame Deer hearing only 21 miles away. Additionally, the project sponsors advertised the hearing times and locations in both the* ***Independent Enterprise*** *and the* ***Rosebud County Press*** *in an effort to solicit participation and input from the residents of Forsyth and Colstrip.*

56 *Federal involvement requires that Wyoming residents, like all neighboring communities, be provided the opportunity to play a role in planning activities related to the Tongue River Basin Project. Impacts (e.g. regional economic conditions, local infrastructure, etc.) from the proposed project will be borne in large part by the Sheridan area. The East Shore Road is unimproved and is maintained by the cabin owners group.*

57 *The State of Montana is not giving any lands to the Northern Cheyenne Tribe. The lands acquired by the Tribe were the result of negotiations between the federal government and the Tribe, and involve only federal lands.*

58 *The project sponsors have made reasonable efforts to disclose to the public everything that is being proposed regarding the Tongue River Basin Project. Paid advertisements and news releases were run throughout the planning phase of the project and especially at times when public input was being sought. The project sponsors are required by law to advertise public scoping meetings, public comment meetings, EIS release dates, and comment deadlines. Public participation activities related to the Tongue River Basin Project have been advertised consistently and the project sponsors have taken measures to allow for more public input into the process than required by law. For instance, in August of 1995, paid advertisements were run in newspapers throughout the project area announcing the project sponsors' decision to extend the public comment period on the draft EIS from 61 days to 82 days. The project sponsors are confident that no information regarding the Tongue River Basin Project has been withheld from the public.*

Comment Number

United States Department of the Interior

TAKE PRIDE IN AMERICA

BUREAU OF INDIAN AFFAIRS
Billings Area Office
316 North 26th St.
Billings, Montana 59101

IN REPLY REFER TO:
Environmental Services

JUL 31 1995

RECEIVED
AUG 01 1995
DNRC

Edward M. Pettit, Environmental Coordinator
Montana Department of Natural Resources and Conservation
P. O. Box 202301
Helena, Montana 59620-2301

Dear Mr. Pettit:

Thank you for the opportunity to review the Tongue River Basin Project Draft Environmental Impact Statement. Numerous beneficial changes have been made to the document since we first reviewed the internal working draft.

59 The document was distributed to the Billings Area Branches of Engineering, Land and Minerals, and Water Resources. None of these branches had comments on the document. Your office previously incorporated many of the suggestions from the Branch of Environmental Services. Therefore, we have no further comment.

Please feel free to contact Mr. Richard Stefanic at 406/247-7911, if additional information or input can assist you.

Sincerely,

David W. Pennington
Acting Deputy Area Director

59 *Comment noted.*

Comment Number

TONGUE RIVER BASIN PROJECT DEIS
PUBLIC COMMENT HEARINGS
JULY 17-21, 1995

Written Comment Form

RECEIVED

AUG 0 1 1995

Please use this form to submit your comments regarding the *Tongue River Basin Project Draft Environmental Impact Statement* (DEIS). Please attach any additional comments you may have that could not be included on this page. Whenever possible, please refer to the specific page, paragraph, etc. of the DEIS that you are commenting on. Your comments will provide valuable input for the preparation of the *Tongue River Basin Project Final Environmental Impact Statement* (FEIS). All substantive comments, along with formal responses from the Tongue River Basin Project sponsors, will be included in the FEIS. Comments can be left at this meeting or can be mailed to:

Edward M. Pettit, Environmental Coordinator
Department of Natural Resources and Conservation
1520 East Sixth Avenue
P.O. Box 202301
Helena, MT 596520-2301

To be included in the FEIS, comments mailed to the above address must be postmarked no later than August 4, 1995.

Comments: We are landowners at the far end of the reservoir with land in Sections 27, 28, 33 and 34 of T.9S., R.40E. as shown by the map on page 3-45. As we read the study and look at the maps (pages 2-9 and 4-27) it appears that either the Labyrinth Wier or the RCC is going to back water up at least right next to us during normal years and over our property during floods. It also looks like we are going to have one big wetland in the middle of our hay fields. While the study claims that the economic impact will be small, it sure doesn't look that way from our perspective. Although it is likely that we will sell our property before the dam is completed, we believe comment on the EIS is appropriate as it will affect us if the sale does not materialize or the new owners if it does. We think the study is deficient in that it fails to address several matters of concern. (See Attached)

If you would like to be included on future mailings, please indicate your name, mailing address, and affiliation on the lines below. Thank you for your interest in this project.

Name and Address: James and Jean Muller, P.O. Box 422, Dayton, Wyoming 82836; Linda Carr, 492 Upper Prairie Dog Road, Banner, Wyoming 82832; Sharon Freeman, 3805 9th Avenue South, Great Falls, Montana 59405; Marcia Gillis, 400 Wolfe Creek Road, Ranchester, Wyoming 82839; Patrick C. Sweeney, P.O. Box 20178, Billings, Montana 59104.

Comment Number

Tongue River Basin Project DEIS
Page Two
July 31, 1995

These concerns are as follows:

60 1. With the reservoir expanded it seems clear that ice jams are more likely than ever to cause flooding of some or all of our hayfields on a annual basis.

61 2. Our ranch has the original river ford used by the stage between Miles City and Sheridan on it. We use it to move machinery back and forth as we farm on both sides of the river. We are afraid the project will back the river up and make the ford impassable thus effectively cutting our ranch in two and making farming more difficult.

62 3. Will the lands condemned from us be fenced?

63 4. Will farming and grazing be allowed in the Badger Creek wetlands?

64 5. Will the public be given the right to use these wetlands and will they be given a right-of-way over our property?

65 6. Will new groundwater saturation from the new reservoir ruin or adversely effect adjacent alfalfa fields?

66 7. Who will be responsible for removing all the debris that would be left from one the 100 year or even 25 year floods?

67 8. Will we be compensated for land that we can no longer farm because it may be flooded?

68 9. Will compensation include payment for the minerals under the land?

Although the impact of the new reservoir on our ranch is not considered much in the great scheme of things, it could a great impact on us. We would therefore appreciate answers to the above questions.

60 *When river ice begins to melt and break up, ice jams can form. Ice jams back water up and can cause flooding. Interviews with local residents and data from the USGS stream gaging station above the dam indicate that ice jamming and flooding occur on the Tongue River above the reservoir. On the average, ice jamming causing at least some flooding in low-lying areas has occurred about once every 5 years since 1960. It is not clear whether existing Tongue River Reservoir operations contribute to ice jamming in the river upstream.*

In rivers, ice jams are most likely to occur near bends and narrows, on shallow bars, or at places where the channel has been artificially constricted, such as at bridge crossings. The literature on ice engineering suggests that reservoirs can create conditions contributing to ice jamming upstream. River currents slow near the head of a reservoir, and floating ice can become backed up in this calm water. Because river ice generally breaks up before reservoir ice, and more quickly, the river ice may pile up and jam against or underneath the ice on a frozen reservoir. Chunks of floating river ice also can become grounded on sediment deposits in shallow water near the head of a reservoir.

*At the proposed full-pool elevation of 3,428.4 feet, the Tongue River Reservoir would influence river levels as far upstream as the railroad bridge crossing in the south half of Section 27 (**see Figure 2-4**). The river just above this bridge is relatively straight and flows between two levees. It then makes a sharp bend to the east and narrows as it passes beneath the bridge. These circumstances create the type of bottleneck where ice jams could form. By keeping the reservoir below full pool during ice break up, reservoir operators could avoid contributing to any ice jamming in the vicinity of this railroad bridge.*

*A lower reservoir pool during break-up, however, could result in ice jamming farther downstream. A railroad and road bridge cross the river near the center of Section 22 (**see Figure 2-4**). Ice jams could occur in the vicinity of these bridges if reservoir levels were kept too low.*

Reservoir operators could consider periodically holding the reservoir at an elevation lower than full-pool during the early portion of peak spring runoff in May. This could help flush out any sediment accumulations in the river channel near the head of the reservoir, and reduce the potential for river ice to jam on shallow bars.

The project sponsors intend to buy flood easements on all lands below an elevation of 3,440 feet adjacent to the Tongue River Reservoir, and along the Tongue River above the reservoir. This is 11.6 feet above the reservoir

elevation at full pool. It is doubtful that ice jamming associated with the reservoir, if it occurs, will cause flooding above elevation 3,440 feet. Specific language could be incorporated into the flood easements to make it clear that they encompass damages associated with any ice jam-related flooding caused by reservoir operations.

61 *Reservoir operations will cause no noticeable increases in water depths at the ford, except during the infrequent times when the reservoir level is so high that water overflows the spillway crest. The new normal full-pool reservoir elevation would be 3,428.4 feet. This is the same as the approximate elevation of the bed of the Tongue River at the railroad bridge crossing approximately 1,000 feet downstream from the ford. DNRC used the HEC-II river hydraulics computer model to determine whether any backwater effects associated with the reservoir could extend farther upstream. The model results indicate that there would be no noticeable increase in river levels upstream from the railroad bridge when the reservoir is at full pool.*

Occasionally, reservoir elevations will be higher than the "full pool" level of 3,428.4 feet, causing water to spill over the spillway crest. When river flows are so high that the reservoir is spilling, the ford would be impassable anyway.

62 *DNRC's typical land acquisition procedure for projects like the Tongue River Basin Project is to acquire land via either fee title or easement. DNRC normally does not condemn the lands that it acquires, but has the authority to do so if necessary. The need for fencing will be evaluated for any land that DNRC acquires as part of the project.*

63 *To protect wetland vegetation, cultivation would not be allowed on wetlands purchased or developed with project mitigation or enhancement funds. Grazing might be allowed if it does not adversely affect the functions or values of these wetlands.*

64 *DNRC's preference would be that all permanent wetland areas would be acquired in fee simple title. DNRC does not expect to need rights-of-way across private land for public use of wetlands.*

65 *Increased reservoir water levels are expected to increase groundwater elevations in the adjacent shallow alluvial aquifer. Impacts of increased groundwater levels to agricultural land at the south end of the reservoir*

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were addressed in an October 24, 1995 internal working document on file at DNRC. The agricultural land that will be affected by higher reservoir water levels is located in sections 27, 28, 33 and 34 of T9S, R40E, and includes alfalfa and grass hay fields.

Of the crops currently grown near the river, alfalfa is the most sensitive to changes in groundwater level. Any of the fields in question are capable of growing alfalfa, so maximum acceptable fluctuating groundwater levels for alfalfa were used to determine the area of potential crop impact.

Alfalfa roots deteriorate if subjected to fluctuating water tables for prolonged periods of time. Alfalfa production will decline if a water table rises into the root zone of alfalfa plants adapted to deeper static water tables and remains for three days or more (Montana Irrigation Manual, Section 3-26).

For optimum alfalfa growing conditions that will not be negatively impacted by a fluctuating water table, 6.5 feet has been established as a conservative minimum depth to the highest fluctuation of the water table in the existing soils. Given that the future maximum level of the reservoir will be 3,428.4 feet, alfalfa might be affected by fluctuating groundwater in fields bordering the reservoir below elevation 3,435 feet.

The total area of agricultural land below elevation 3,435 feet adjacent to the reservoir is approximately 196 acres. Areas of land below elevation 3,433 feet probably will not support vehicles or heavy machinery when the reservoir is at full pool.

66 *The project sponsors are not proposing changes in the responsibility for removing flood-related debris. Contact your county floodplain administrator for additional information regarding this issue.*

67 *The project sponsors anticipate compensating you for lands that will lose productivity as a result of the project. As indicated in **Section 2.3.1 of the EIS** and the **response to Comment number 60**, all inundated lands up to elevation 3,440 feet, and other shoreline land subject to potential flooding during extreme flood events would be acquired by DNRC (as an easement or in fee simple title) with fair market compensation offered to landowners for market value losses. DNRC has authority to use eminent domain in land acquisition.*

68 *DNRC has no plans to purchase mineral rights as part of the proposed Tongue River Basin Project.*

RECEIVED
AUG 0 4 1995
DNRC

August 1, 1995

Mr. Edward Pettit, Environmental Coordination
Montana Department of Natural Resources and Conservation
1520 East 6th Ave
P.O Box 202301
Helena MT 59620-2301

AE: Tongue River Basin Project Draft Environmental Impact Statement

Dear Sirs:

Following are comments offered by the County Weed Districts of Custer, Rosebud, Big Horn, and Powder River Counties and the Northern Cheyenne Tribe in reference to the Tongue River Basin E.I.S.. We would like to refer you or the applicable person to the County Noxious Weed Control Act., from page 1 through 11. Page 11 to end are our comments and opinions refrenced by sections when ever questions arose.

Section 1.5 Page 1-5 referring to Appendix A - Applicable Laws, Regulations and Agency involvement. We would like to refer you or the applicable person to the

COUNTY NOXIOUS WEED CONTROL ACT

Title 7, Chapter 22

Sections

7-22-2101 through 7-22-2153

MCA

Amended 1991

AND RULES

Rules 4.5.201 through 4.5.203

State of Montana
Department of Agriculture
Agricultural and Biological Sciences Division
Capitol Station
Helena, MT 59620-0205
(406) 444-2944

7-22-2101 Definitions. As used in this part, unless the context indicates otherwise, the following definitions apply:

(1) "Board" means a district weed board created under 7-22-2103 MCA

(2) "Commissioners" means the board of county commissioners.

(3) "Department" means the department of agriculture provided for in 2-15-3001.

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(4) "District" means a weed management district organized under 7-22-2102.

(5) "Native plant" means a plant endemic to the state of Montana

(6) "Native plant community" means an assemblage of native plants occurring in a natural habitat.

(7) (a) "Noxious weed or weeds" means any exotic plant species established or that may be introduced in the state which may render land unfit for agriculture, forestry, livestock, wildlife or other beneficial uses or that may harm native plant communities and that is designated:

(i) as a statewide noxious weed by rule of the department; or

(ii) as a district noxious weed by a board, following public notice of intent and a public hearing.

(b) A weed designated by rule of the department as a statewide noxious weed must be considered noxious in every district of the state.

(8) "Persons" mean an individual, partnership, corporation, association, or state or local government agency or subdivision owning, occupying, or controlling any land, easement, or right-of-way, including any county, state, or federally owned and controlled highway, drainage or irrigation ditch, spoil bank, borrow pit, or right-of-way for a canal or lateral.

(9) "Supervisor" means the person employed by the board to conduct the district noxious weed management program and supervise other district employees.

(10) "Weed management" or "control" means the planning and implementation of a coordinated program for the containment, suppression, and, where possible, eradication of noxious weeds.

7-22-2102 WEED MANAGEMENT DISTRICTS ESTABLISHED. A weed management district shall be formed in every county of this state and shall include all the land within the boundaries of the county.

7-22-2103 DISTRICT WEED BOARD - - - APPOINTMENTS AND TERMS

(1) The commissioners shall appoint a district board.

(2) The commissioners at a public meeting, pass a resolution establishing the number of members of the district weed board ,and the terms of the appointments. The board consists of three members and the members of the board must be residents of the district. A majority of the board members must be rural agricultural land owners.

(3) The county extension agent in each county and other interested individuals may be appointed to serve as a nonvoting member of that district's weed board.

(4) The board members are public officers.

(5) The board may call upon the county attorney for legal advice and services as it may require.

7-22-2104 TERM OF OFFICE

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(1) Except as provided in subsection (2), a member of a district weed board serves a term of 3 years and until the qualification of his successor. The term of office begins January 1.

(2) When a three-member weed board is established, the initial board members serve terms of 1, 2, and 3 years, respectively, as designated by the commissioners. When a five-member weed board is established, two of the initial members serve terms of 1 year, two serve terms of 2 years, and one serves a term of 3 years. After expiration of any initial term of office, the successor serves a 3 year term as provided in subsection (1).

7-22-2105 ORGANIZATION OF DISTRICT WEED BOARD AND COMPENSATION.

(1) The board shall organize by choosing a chairman and a secretary. The secretary may or may not be a member of the board.

(2) Salary, per diem, and mileage of such board members shall be set by resolution of the commissioners.

(3) A majority of the board constitutes a quorum for the conduct of business.

7-22-2106 RENUMBERED 7-22-2115 BY CODE COMMISSIONER, 1985

7-22-2107 RENUMBERED 7-22-2116 BY CODE COMMISSIONER, 1985

7-22-2108 RENUMBERED 7-22-2117 BY CODE COMMISSIONER, 1985

7-22-2109. POWERS AND DUTIES OF BOARD

(1) The board may:

(a) employ a supervisor and other employees as necessary and provide for their compensation;

(b) purchase such chemicals, materials, or equipment and pay other operational costs as it determines necessary for implementing an effective weed management program. Such costs must be paid from noxious weed fund.

(c) determine what chemicals, materials, or equipment may be made available to persons controlling weeds on their own land. The cost for such chemicals, materials, or equipment must be paid by such person and collected as provided in this part.

(d) enter into agreements with the department for the control and eradication of any new exotic plant species not previously established in the state which may render land unfit for agriculture, forestry, livestock, wildlife, or other beneficial use if such plant species spreads or threatens to spread into the state; and

(e) perform other activities relating to weed management.

(2) The board shall:

(a) administer the district's noxious weed program;

(b) establish management criteria for noxious weeds on all land within the district;

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(c) make all reasonable efforts to develop and implamant a noxious weed program covering all land within tha district owned or administered by a fedaral agency.

7-22-2110 ADMINISTRATIVE HEARING - - APPEALS.

(1) A person adversely affected by any notice, action, or order of the board may request an administrative haaring before tha board. Tha board shall hold a hearing within 30 days of tha request. Participants may be represented by legal counsel. The board shall make a record of the proceeding and enter its order and findings within 7 days after the hearing.

(2) An order of the board may be appealed to the commissioners within 30 days from the tima the order is entered. The commissioners shall hear such appeal within 30 days after the notice of appeal and shall render their order and findings within 7 days aftar such hearing. Participants may be represented by legal counsel.

(3) Within 30 days after the commissioners rendar their ordar and findings, tha person advarsely affected may file a petition in district court requesting that the order and findings of tha commissioners be set aside or modified. The court may affirm, modify, or set aside the order complained of, in whole or in part.

7-22-2111 (TEMPORARY) LIABILITY RESTRICTIONS. A district, as defined in 7-22-2101, is liabla for damagas caused by its use of herbicides only for an act or omission that constitutas gross negligence. Tha provisions of 2-9-305 apply to board mambers, supervisors, and employeas of a district. (Terminates July 1, 1995 --Sec. 7, ch. 530, l. 1991)

7-22-2112 (TEMPORARY) INFORMATION ON HERBICIDE USE. The district must provide information on protective clothing, health hazards, and proper application techniques to mixers, loadars, and applicators of harbicides and make information available for review by the public at the district office. (Terminates July 1, 1995 -- Sec. 7, ch. 530, L. 1991.)

7-22-2113 AND 7-22-2114 RESERVED

7-22-2115 NOXIOUS WEEDS AND SEEDS DECLARED NUISANCE. Noxious weeds and seeds of any noxious weed are hareby declared a common nuisance.

7-22-2116 UNLAWFUL TO PERMIT NOXIOUS WEEDS TO PROPAGATE. It is unlawful for any person to permit any noxious weed to propagate or go to seed on his land, except that any person who is in compliance with the following weed management plan.

7-22-2117 VIOLATIONS.
(1) Any person who in any manner intarferes with the board or its authorized agent in carrying out the provisions of this part or who refusas to obey an order or notice of the board is guilty of a misdemeanor, and upon conviction thereof, he shall be fined not to exceed $100 for tha first offense and not less than $100 or more than $200 for each subsequent offense.

(2) All fines, bonds, and penalties collected under the provisions of this part, except those collected by a justice's court, shall be paid to the county treasurer of each county and placed by him to the credit of a fund to be known as the noxious weed fund

7-22-2118 Through 7-22-2120 RESERVED.
7-22-2121 WEED MANAGEMENT PROGRAM.

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(1) The noxious weed management program must be based on e plan epproved by the board.

(2) The noxious weed managament plan must:

e. Specify tha goels end prioritias of the program:

b. Review the distribution end abundance of each noxious weed species known to occur within the district end specify the location of new infestations and arees particularly susceptible to new infestations;

c. Specify pesticide managemant goals end procedures, including but not limited to watar quality protection, public and worker safety, equipmant selection and maintanance, and pesticide selection, application, mixing, loading, storage, and disposal; end

d. estimate the personnal, operations, and equipment cost, of the proposed program.

(3) The board shell provide for the management of noxious weeds on all land or right-of-way owned or controlled by a county or municipality within tha confines of the district. It shall take particular precautions while managing the noxious weeds to preserve beneficial vegatation end wildlife hebitat. Where at all possible, methods for such control shall include cultural, chemical end biological methods.

(4) The board may establish special managemant zones within the district. The management critaria in such zones may be more or less stringant than the ganeral menagement critarie for tha district.

7-22-2122 REPEALED SEC 32, CH. 607, L. 1985

7-22-2123 PROCEDURE IN A CASE OF NONCOMPLIANCE

(1) Where compleint has bean made or the board has reason to believe that noxious weeds described in this part ere present upon a person's land within the district in violation of the law, that person must be notified by mail or telephone of the complaint and the boerd may request inspection of such land. The board or its authorized agant and the landowner or his representetive shall inspect the land at an agreeable time, within 10 days of notification of tha landowner. If after reesonabla effort the board is unable to gain cooperation of the person, the boerd or its authorized agent may entar end inspect the land to determine if the complaint is veild.

(2) If noxious weeds are found, the board or supervisor shall notify the person or his representative and seak voluntary compliance with the district weed control program. If voluntary compliance is not possible, notice of noncompliance must be sent to the person by certified mail.

(3) The notice must specify:

(e) the basis for the determination of noncompliance;

(b) the geographic location of tha area of noncompliance, by legal description or other reesonably identifiable description.

(c) measures to be undertaken in ordar to comply with the district's management criteria; and

d) e reasonable period of time, not less than 10 days, in which compliance measures must be initiated; and

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e) the right of tha person to request, within the time specified in subsection (3) (d), an administrative hearing as provided by 7-22-2110.

(4) A person is considered in compliance if he submits and tha board accepts a proposal to undertake specified control maasures and is in compliance for so long as he performs according to the terms of tha proposal. If the maasures proposed to be takan extend beyond the current growing season, the proposal and accaptance must be in writing.

(5) In accepting or rejecting a proposal, the board shall consider the economic impact on tha person and his neighbors, practical biological and environmental limitation, and alternative control mathods to be used.

7-22-2124 DESTRUCTION OF WEED BY BOARD

(1) If correctiva action is not taken and no proposal is made and accepted or no request for an administrative hearing is made within tha tima specified in the notice, the board may forthwith enter upon tha person's land and institute appropriate control measures.

In such case the board shall submit a bill to the person, itemizing man-hours of labor, material, and equipmant tima, together with a penalty not exceeding 10% of the total cost incurred. Labor and equipment must be valued at the current rate paid for commercial management operations in the district. The bill must specify and ordar a payment due date of 30 days from tha date the bill is sent.

(2) A copy of the bill must be submitted by the board to the county clerk and recorder.

(3) If a person receiving an order to taka corrective action requests an administrative haaring, the board may not institute control measures until the matter is finally rasolved except in case of an emergancy. In such case, the person is liable for cost as provided in subsection (1) only to the extent determined appropriate by the board commissioners, or court that finally resolvas the matter.

7-22-2125. REPEALED. SEC. 32, CH. 607, L. 1985

7-22-2126 EMBARGO. Tha board may establish voluntary ambargo programs to reduce the spread of noxious weeds within the district or the introduction of noxious weeds into the district.

7-22-2127. REPEALED. SEC 32, CH. 607, L. 1985

7-22-2128 AND 7-22-2129 RESERVED.

7-22-2130. WEED DISTRICT SUPERVISOR TRAINING. Within tha limitations of available funds, the board shall ensura that the waed district supervisor obtains training to properly implement the noxious weed managamant program described in 7-22-2121. The department shall specify through rule making the laval and type of training necessary to fulfill this requirement.

7-22-2131 THROUGH 7-22-2140 RESERVED.

7-22-2141. NOXIOUS WEED FUND AUTHORIZED.

(1) The commissioners of each county in this stata shall create a noxious weed managemant fund, to be designated the "noxious weed fund."

(2) This fund shall be kept separate and distinct by the county treasurer.

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7-22-2142. SOURCE OF MONEY FOR NOXIOUS WEED FUND.

(1) The commissioners may create the noxious weed fund and provide sufficient money in the fund for the board to fulfill its duties, as specified in 7-22-2109, by:

a. appropriating money from the general fund of the county;

b. at any time fixed by law for levy and assessment of taxes, levying a tax not exceeding 2 mills on the dollar of total taxable valuation in the county. The tax levied under this subsection must be identified on the assessment as the tax that will be used for noxious weed control; and

c. levying a tax in excess of 2 mills if authorized by a majority of the qualified electors voting in an election held for this purpose pursuant to 7-6-2531 through 7-6-2436.

(2) The proceeds of the noxious weed control tax must be used solely for the purpose of managing noxious weeds in the county and must be designated to the noxious weed fund.

(3) Any proceeds from work or chemical sales must revert to the noxious weed fund and must be available for reuse within that fiscal year or any subsequent year.

(4) The commissioners may accept any private, state, or federal gifts, grants, contracts, or other funds to aid in the management of noxious weeds within the district. These funds must be placed in the noxious weed fund.

7-22-2143. DETERMINATION OF COST OF WEED CONTROL PROGRAM. Based on the board's recommendations, the commissioners shall determine and fix the cost of the control of noxious weeds in the district, whether the same be performed by the individual landowners or by the board.

7-22-2144. PAYMENT OF COST OF WEED CONTROL PROGRAM. The total cost of such control shall be paid from the noxious weed fund. The cost of controlling such weeds growing along the right-of-way of a state or federal highway shall, upon the presentation by the board of a verified account of the expenses incurred, be paid from the state highway fund in compliance with 7-14-2132 and any agreement between the board and the department of highways. Costs attributed to other lands within the district shall be assessed to and collected from the responsible person as set forth in 7-22-2116.

7-22-2145. EXPENDITURES FROM NOXIOUS WEED FUND.

(1) The noxious weed fund must be expended by the commissioners at the time and in the manner as is recommended by the board to secure the control of noxious weeds.

(2) Warrants upon the fund must be drawn by the board. Warrants may not be drawn except upon claims duly itemized by the claimant, except payroll claims that must be itemized and certified by the board, and each claim must be presented to the commissioners for approval before the warrant is countersigned by the commissioners.

7-22-2146. FINANCIAL ASSISTANCE TO PERSONS RESPONSIBLE FOR WEED CONTROL.

(1) The commissioners, upon recommendation of the board, may establish cost-share programs with any person, specifying costs that may be paid from the noxious weed fund and costs that

must be paid by the person. Cost-share programs mey be established for special projects and for established management zones.

(2) e. When under the terms of any voluntary agreement, whether entered into pursuant to 7-22-2123 or otherwise, or under eny cost-share program entered pursuant this section e person incurs eny obligation for materials or services provided by the board, the board shall submit e bill to the person, itemizing man-hours of labor, material, end equipment time. The bill must specify end order a payment due date not less that 30 days from date the bill is sent.

b. A copy of the bill must be submitted by the board to the county clerk and recorder. If the sum to be repaid by the person billed is not repeid on or before the due date, the county clerk and recorder shall certify the emount thereof, with the description of the land to be charged, and shall enter the sum on the assessment list as a special tax on the land, to be collected in the manner provided in 7-22-2148.

7-22-2147. REPEALED. SEC 32, CH. 607, L. 1985

7-22-2148. TAX LIABILITY FOR PAYMENT OF WEED CONTROL EXPENSES.

(1) The expenses referred to in 7-22-2124 shall be paid by the county out of the noxious weed fund, end unless the sum to be repaid by the person billed under 7-22-2124 is repaid on or before the date due, the county clerk shall certify the amount thereof, with the description of the lend to be charged, and shall enter the same on the assessment list of the county as e special tax on the end. If the land for eny reason is exempt from general taxation, the emount of such charge may be recovered by direct claim against the lessee and collected in the same manner as personnel taxes. When such charges ere collected, they shall be credited to the noxious weed fund.

(2) In determining what lands are included as land covered by the special tax and are described in the certificate of the county clerk, it is presumed that all work done upon any land of any one lendowner is for the benefit of all of the land within the district belonging to the owner, together with the parcel upon which the work was done, and the amount certified becomes e tax upon the whole thereof.

7-22-2149. RESPONSIBILITY FOR ASSESSMENTS AND TAXED FOR WEED CONTROL LEVIED ON LEASED STATE LANDS. The lessee of agricultural state land is responsible for essessments and taxes levied by the board of county commissioners for the district as provided in 77-6-114.

7-22-2150. COOPERATION WITH STATE AND FEDERAL AID PROGRAMS. The board is empowered to cooperate with any state or federal eid program that becomes avellable. Under such a plan of cooperation, the direction of the program shall be under the direct supervision of the board of the district in which the program operates.

7-22-2151. COOPERATIVE AGREEMENTS

(1) Any state agency controlling land within a district, including the department of highways; the department of state lands; the department of fish, wildlife, and parks; the department of institutions; the department of natural resources and conservation; and the university system, shall enter into e written agreement with the board. The agreement must specify mutual responsibilities for noxious weed management on state owned or state controlled land within the district.

(2) The board end the governing body of eech incorporated municipality within the district shall enter into a written agreement and shall cooperatively plan for the management of noxious weeds within the boundaries of the municipality. The board may implement management

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procedures described in the plan within the boundaries of the municipality for noxious weeds only. Control of nuisance weeds within the municipality remains the responsibility of the governing body of the municipality, as specified in 7-22-4101.

(3) A board may develop and carry out its noxious weed management program in cooperation with the boards of other districts, with state and federal governments and their agencies, or with any persons within the district. The board may enter into cooperative agreements with any of these parties.

7-22-2152. REVEGETATION OF RIGHT-OF-WAY AND DISTURBED AREAS.

(1) Any state agency or local government unit approving a mine, major facility, transmission line, solid waste facility, highway, subdivision, or any other development resulting in significant disturbance of land within a district shall notify the board.

(2) Whenever any person or agency disturbs vegetation on an easement or right-of-way within a district by construction of a road, irrigation or drainage ditch, pipeline, transmission line or other development, the board shall require that the disturbed areas be seeded, planted, or otherwise managed to reestablish a cover of beneficial plants.

(3) a. The person or agency disturbing the land shall submit to the board a written plan specifying the methods to be used to accomplish revegetation. The plan must describe the time and method of seeding, fertilization practices, recommended plant species, use of weed free seed, and the weed management procedures to be used.

b. The plan is subject to approval by the board, which may require revisions to bring the revegetation plan into compliance with the weed management plan. Upon approval by the board, the revegetation plan must be signed by the chairman of the board and the person or agency responsible for the disturbance and constitutes a binding agreement between the board and such person or agency

7-22-2153. VOLUNTARY AGREEMENTS FOR CONTROL OF NOXIOUS WEEDS ALONG ROADS.

(1) Any person may voluntarily seek to enter into agreement or the management of noxious weeds along a state or county highway or road bordering or running through his land. The supervisor may draft such an agreement upon the request of and in cooperation with the person and, upon approval of the board, by the chairman. An agreement involving a state highway right-of-way must also be signed by a representative of the department of highways.

(2) The agreement must contain a statement disclaiming any liability of the board and, if applicable, the department of highways for any injuries or losses suffered by the person in managing noxious weeds on the state or county highway right-of-way. The signed agreement transfers responsibility for managing noxious weeds on the specified section of right-of-way from the board to the person signing the agreement. If the board later finds that the person has failed to adhere to the agreement, the board shall issue an order informing the person that the agreement will be void and that responsibility for the management of noxious weeds on the right-of-way will revert to the board unless the person complies with the provisions of the agreement within a specified time period.

RULES
COUNTY NOXIOUS WEED LIST
SUB-CHAPTER 2
DESIGNATION OF NOXIOUS WEEDS

Comment Number

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4.5.201. DESIGNATION OF NOXIOUS WEEDS. The department designated certain exotic plants listed in these rules as statewide noxious weeds under the County Weed Control Act 7-22-2101 (5), MCA. All counties must implement management standards for these noxious weeds consistent with weed management criteria developed under 7-22-2109 (2)(b) of the Act. The department established three categories of the noxious weeds. (History:Sec.7-22-2101 MCA; IMP, Sec. 7-22-2101 MCA; NEW 1986, p. 337, Eff. 3/14/86; AMD, 1991 MAR p. 511, Eff 4/26/91.)

4.5.202 CATEGORY 1.

(1) Category 1 noxious weeds are weeds that are currently established and generally widespread in many counties of the state. Management criteria includes awareness and education, containment and suppression of existing infestations and prevention of new infestations. These weeds are capable of rapid spread and render land unfit or greatly limit beneficial uses.

(2) The following are designed as category 1 noxious weeds:

a. Canada Thistle (Cirsium arvense)
b. Field Bindweed (Convolvulus arvensis)
c. Whitetop or Hoary Cress (Cardaria draba)
d. Leafy Spurge (Euphorbia esula)
e. Russian Knapweed (Centaurea repens)
f. Spotted Knapweed (Centaurea maculosa)
g. Diffuse Knapweed (Centaurea diffusa)
h. Dalmation Toadflax (Linaria dalmatica)
i. St. Johnswort (Hypericum perforatum)
j. Sulfur (erect) cinquefoil (Potentilla recta)

(History: Sec. 7-22-2101 MCA; IMP, Sec. 7-22-2101 MCA; NEW 1986 MAR p. 337, Eff. 3/14/86; AMD, 1991 MAR p. 511, Eff. 4/26/91; AMD, 1994 MAR p.93.Eff 3/18/94.)

4.5.203. CATEGORY 2.

(1) Category 2 noxious weeds have recently been introduced into the state or are rapidly spreading from their current infestation sites. These weeds are capable of rapid spread and invasion of lands, rendering lands unfit for beneficial uses. Management criteria includes awareness and education, monitoring and containment of known infestations and eradication where possible.

(2) The following are designated as category 2 noxious weeds:

a. Dyers Woad (Isatis tinctoria)
b. Purple Loosestrife or Lythrum (Lythrum salicaria, L. virgatum and any hybrid crosses thereof).

(History: Sec. 7-22-2101 and 80-7-802 MCA; MP Sec 7-22-2101 MCA: EW 1986 MAR p.337, Eff 3/14/86; AMD 1989 MAR p. 899, Eff. 7/14/89; AMD 1991 MAR p. 511, Eff. 4/26/91; AMD 1994, MAR p. 93, Eff. 3/18/94.)

4.5.204. CATEGORY 3

(1) Category 3 noxious weeds have not been detected in the state or may be found only in small, scattered, localized infestations. Management criteria includes awareness and education,

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earlydetection and immediate action to eradicate infestations. These weeds are known pests in nearby states and are capable of rapid spread and render land unfit for beneficial uses.

(2) The following are designated as category 3 noxious weeds:

a. Yellow Starthistle (Centaurea solstitialis)
b. Common Crupina (Crupina vulgaris)
c. Rush Skeletonweed (Chondrilla Juncea)

(History: Sec 80-7-802 MCA; IMP, Sec 7-22-2102 MCA; NEW 1991 MAR p. 511, Eff. 4/26/91.)

Reference 2.3.2.5 *Structure and Shore Erosion Protection*, is referencing Riprap and the source of where it will be coming from.

69 Comment The County Weed Districts recommend that riprap come from a certified weed free gravel pit. Local riprap pits should be inspected by county weed district personnel for noxious weeds before mining begins.

Reference 2.3.3.5 *Structure and Shore Erosion Protection*, is referencing using riprap from eastern Wyoming and hauling it by rail to Sheridan Wy. and then trucking it to the site.

70 Comment The County Weed Districts recommend that riprap come from a certified weed free gravel pit. The Counties will recognize a Wyoming's weed district inspected pit. Pits must be free of all Category 1, 2 ,and 3 weeds.

Reference *Land Disturbance*, refers to the 157 acres that will be disturbed for mining, county and campground roads, rail road, and load out.

71 Comment The County Weed districts would like to refer you to 7-22-2152 Revegetation of Right-of-way and Disturbed areas of the County Noxious Weed Control Act.

Reference 2.3.8 *Facility Monitoring and Reclamation* refers to Construction Staging Area, Aggregate Site No. 1, Aggregate Site No. 2, Haul Roads, and Railroad Unloading Facilities.

72 Comment The Weed Districts would like to refer you to 7-22-2121 Weed Management Program and 7-22-2152 Revegetation of Right-of-way and Disturbed areas of the County Noxious Weed Control Act.

Reference 2.3.9.5 *Additional Habitat Mitigation*

73 Comment The Weed Districts are concerned with the programs to be initiated. Is there a weed plan in place. Please refer to section 7-22-2121 Weed Management Program of the County Noxious Weed Control Act.

Reference 2.3.9.6 *Wet Land Mitigation*

74 Comment There has been reference to the monitoring and the detection of noxious weeds, but the weed districts need to know what measures will be taken as to the control and prevention of noxious weeds.

Reference 2.3.9.12 *Transportation Mitigation*, refers to the moving of County road 380 and the use of roads during hauling.

75 Comment The weed districts would like to know how the roads will be revegetated. They would like to refer you to 7-22-2152 of the County Noxious Weed Control Act.

69 *The project sponsors share your concerns regarding the spread of noxious weeds. The final design contract for construction of the proposed Tongue River Basin Project will include provisions requiring that riprap pits (both local pits and those in Wyoming) be inspected by the appropriate weed district personnel before excavation begins. If practical, the project sponsors will use riprap from weed free pits.*

70 ***See response to Comment number 69.***

71 *As stated throughout the EIS, the project sponsors recognize fully the need to reclaim and revegetate all areas that will be disturbed during construction and related project activities (mitigation, enhancement, etc.). Such efforts represent the project sponsors' commitment to comply fully with the Noxious Weed Control Act. In the EIS, the project sponsors acknowledge that formal reclamation plans will be developed during the final design phase of the project. However, as described in those sections of the EIS that address facility monitoring and reclamation, all reclamation plans will include, at a minimum, recontouring and revegetation of all disturbed areas including the construction staging area, aggregate mining sites, campground roads, haul roads, and railroad unloading facilities. As final design progresses, the project sponsors will submit all proposed mitigation plans to the county weed districts for review.*

72 ***See response to Comment number 71.***

73 *The project sponsors' weed control plan (to be developed in consultation with the county weed districts as described in the **response to Comment number 71**) will include provisions for habitat mitigation sites.*

74 *The specific measures to be taken for controlling and preventing the spread of noxious weeds will be approved by the county weed districts as the project sponsors finalize the proposed weed control plan.*

75 ***See response to Comment number 71.***

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Reference 2.3.9.13 *Fish and Wildlife Habitat Enhancement Features*

76 Comment Section 2.3.9.13 refers to "Eradication of unwanted species" But does not mention noxious weeds nor does the further discussion in Chapter 3 of Biological Diversity. Eradication of many noxious weeds is thought to be impossible at present time, therefore management and prevention of weed problem is a more realistic way to address this situation.

Reference 2.3.9.13 # 15 *develop weed control programs*

77 Comment There are already many weed control programs in place within the counties, we ask you to refer to section 7-22-2121 of the Noxious Weed Control Act. These programs should address more than the Enhancement Features Plan in Appendix C-5.

Reference 3.11 *Vegetation*

78 Comments Although Salt cedar, not a state noxious weed, is addressed there are several Category 1 noxious weeds that are already established in the basin that need to be addressed. Some of these weeds are Leafy Spurge, Canada Thistle, Russian and Spotted Knapweed, Sulfur Cinquefoil and Field Bindweed.

Reference 3.12 *Biodiversity #4 promote native species and avoid introducing non-native species*

79 Comment How are these practices going to be implemented?

Reference 4.11.1.1 *Increased Reservoir Water Surface Elevations*

80 Comment This section addresses Salt cedar once again as a problem but doesn't address the Noxious weeds already present in the 4 counties and the Reservation.

Reference 4.11.1.2 *Road Construction*

81 Comment Road construction - It is very important that revegetation to the road surface edge be completed to minimize the introduction of noxious weeds. We would like to refer you to section 7-22-2152 of the County Noxious Weed Act.

Reference 4.11.1.5 *Wildlife - Wetland Mitigation*

82 Comments It is important to remember that salt cedar will destroy wetland habitat, proper use and application of herbicides labeled for aquatic use will have minimal effect on non targeted species. Proposed eradication or control of Salt cedar requires integrated pest management, including the use of herbicides. It has been proven that one method of control such as physical, will not control or eradicate exotic plant species such as Salt cedar.

Reference 4.12.1 *Effects Common to the Action Alternatives*

83 Comments This section mentions weeds as a problem for future development, but doesn't recognize the existing problem or discuss prevention. Prevention is the number one criteria when dealing with noxious weed species.

84 In summation, upon review of the document, we find no reference, to or compliance with, Section 7-22-2101 through 7-22-2153 of the County Noxious Weed Control Act. Neither do we find a regard for or understanding of county weed control practices. The Counties and Tribe involved recognize their responsibility to manage and control noxious weeds in the Tongue River Basin.

76 *__Section 2.3.9.13__ contains a list of the types of projects or programs currently under consideration as enhancement features. Item 15 in this list is to develop weed control programs (__see also response to Comment number 77__). The "existing environment" discussion in Chapter 3 has been expanded to include a list of noxious weeds in the basin. The project sponsors agree that a prevention and management program is a more realistic approach to weed problems than the hope that they could be eradicated.*

Noxious weeds found in the Tongue River basin counties are indicated in __Chapter 3, Section 3.11 of the EIS__.

77 *As indicated in the __response to Comment number 76__, the development of weed control programs is one of many features currently under consideration for project-related fish and wildlife habitat enhancement activities. As indicated in the __responses to Comment numbers 71 and 79__, efforts to prevent or control the spread of noxious weeds also will be a fundamental component of numerous other project-related activities, including inspection of aggregate excavation pits and facility monitoring and reclamation.*

78 *The vegetation section in __Chapter 3__ has been revised to include a list of noxious weeds within the basin (__see Section 3.11 of the EIS__).*

79 *Prior to project construction, the project sponsors would develop a weed control plan that would be approved by the county weed board. The plan would include detailed mapping of noxious weeds in all areas that would be disturbed by construction. Contracts would require that all equipment be steam cleaned and arrive at the site in a weed free condition. Weedy areas that would be disturbed would be pre-treated with herbicides to kill or severely reduce that year's plant and seed production and reduce the chances that weed seeds be transported to uninfested sites. The plan also would evaluate potential sources of weed introduction and mitigate for them to prevent new weeds from being brought into the area. If reasonably available, weed-free sources of gravel, riprap, and fill would be used. The project sponsors also would fund a program of monitoring and control of weeds on areas disturbed by construction. Advice and cooperation of county weed control boards would be sought when developing this monitoring plan. Weed control could consist of physical, chemical, and biological methods, depending on the species involved and the local conditions such as proximity to wetlands, reservoirs, and streams. All areas disturbed by construction would be promptly reclaimed and reseeded. The weed control program also would apply to any areas developed as part of project-related mitigation and enhancement activities.*

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85 The Settlement Act allocated 4.6 million dollars for enhancement of fish and wildlife habitat. Noxious weed control is a priority for habitat enhancement and preservation. A trust of 1.5 million dollars, to be used by the counties weed districts and Tribe to prevent, suppress, and eradicate noxious weeds in the Tongue River Basin is necessary. This would insure that the counties and the tribe will have adequate funding to fight noxious weeds, insuring ecosystem stability, in the Tongue River Basin for many years to come.

Sincerely:
Rosebud, Custer, Big Horn, and Powder River County Weed Districts and the Northern Cheyenne Tribe

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Rt. 82 Box 33A
Broadus Mt, 59317

Northern Cheyenne Tribe
Box 128
Lame Deer Mt 59043

80 ***See responses to Comment numbers 76, 78, and 79.***

81 *Contracts would specify that topsoil would be salvaged on all new or enlarged road cuts or fills. This salvaged topsoil would be respread over disturbed areas. Road surface edges and cut and fill slopes would be seeded in the fall or spring following construction with a mix recommended for the area by USDA Natural Resource Conservation Service.*

82 *The project sponsors concur with the comment.* ***See response to Comment number 79.***

83 *The vegetation section of* ***Chapter 3*** *has been revised to include a description of noxious weeds currently found in the basin (****see Section 3.11 of the EIS****). Prevention of the spread of noxious weeds will be an important aspect of the weed control plan described in* ***response to Comment number 79.***

84 *As evidenced in the responses to all of the county weed districts' comments, the Tongue River Basin Project sponsors do recognize and understand county weed control practices and recognize and appreciate the districts' efforts to manage and control noxious weeds in the Tongue River Basin. Furthermore, the project sponsors will do everything practicable to control and/or manage noxious weeds in the project area.*

85 *As noted in the* ***response to Comment number 76****, eradication of weeds, while a commendable goal, will be more difficult than preventing the spread of weeds into new areas, and suppressing existing infestations. County weed supervisors have been contacted and were requested to submit a more detailed proposal to the project sponsors. All proposals for mitigation and enhancement will be reviewed and ranked by an Inter-Agency Mitigation and Enhancement Oversight Group. The highest ranked projects would be recommended for funding; lower ranked projects may not be funded.*

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THE STATE OF WYOMING

JIM GERINGER
GOVERNOR

GORDON W. FASSETT
STATE ENGINEER

State Engineer's Office

Herschler Building, 4 E
(307) 777-7354

Cheyenne, Wyoming 82002
FAX (307) 777-5451

August 8, 1995

Mr. Edward M. Pettit, Environmental Coordinator
Montana DNRC
P.O. Box 202301
Helena, MT 59620-2301

Dear Mr. Pettit:

86 Thank you for sending a copy of the Tongue River Basin Project draft Environmental Impact Statement to the Wyoming State Engineer's Office for our review. We have worked closely with the State of Montana as the Northern Cheyenne Compact was negotiated to assure that Wyoming's compact allocations under the Yellowstone River Compact would not be impaired by the Tongue River Reservoir rehabilitation or other aspects of the negotiated settlement with the Northern Cheyenne. As you may know, a separate agreement was developed between the Governors of Wyoming and Montana in 1992 recognizing Wyoming's present and future water uses. I am enclosing a copy of that agreement for your information.

87 In Chapter 2, a discussion is made of other potential projects in the area that could have an impact on the Tongue River Basin Project. The Twin Lakes enlargement, Tie Hack Reservoir and Little Horn Energy projects in Wyoming were presented. It may help the reader to point out that only the Twin Lakes project lies within the Tongue River basin. Some may not recognize that the Tie Hack project is in the Powder River basin and the Little Horn Energy project is in the Little Bighorn River drainage.

88 On page 4-68 and in Appendix E, Tables E-11 and E-12, a discussion of the hydrologic modeling for the project is discussed. There is a comparison made of current water use in Wyoming's portion of the drainage and an estimate of "full development" by Wyoming. As I recall the information that was provided by this office to Mr. Glen McDonald of the Montana DNRC, Wyoming was only making an estimate of the additional supplemental supplies that might be applied to pre-1950 original supply water rights. We did not make an estimate of what the total development of our full Compact allocation may be in the Tongue River basin. While the modeling effort presented in the EIS probably doesn't need to be

86 *The project sponsors thank the Wyoming State Engineers' Office for providing a copy of the 1992 agreement between the State of Wyoming and the State of Montana recognizing Wyoming's present and future uses of Tongue River water. The sponsors are familiar with the provisions of the agreement, especially as they relate to the Tongue River Water Model that was used during Compact negotiations and preparation of the EIS.*

87 *The project sponsors recognize that of the reasonably foreseeable projects in Wyoming that could have an impact on the proposed Tongue River Basin Project, only the Twin Lakes project lies within the Tongue River drainage. The project sponsors included the Tie Hack Reservoir and Little Horn Energy projects in the analysis of reasonably foreseeable activities because other resource-related considerations (e.g. regional economic conditions, employment, transportation, infrastructure) could be affected if those projects were implemented at the same time as the Tongue River Basin Project. This point has been clarified in **Section 2.5 of the EIS**.*

88 *The "full Wyoming development" hydrologic modeling results presented in **Appendix E of the EIS** are meant to represent complete Wyoming development as allowed under the Yellowstone River Compact. These results include the information on supplemental supplies your office forwarded to Mr. McDonald and Wyoming's 40 percent of the estimated remaining unallocated water in the basin. As you know, the Yellowstone River Compact allocates 60 percent of the unused and unappropriated waters of the Tongue River as of 1950 to Montana, and 40 percent to Wyoming. The 60/40 split is measured where the Tongue River enters the Yellowstone River at Miles City. In the Tongue River model, 1950 water commitments (appropriated water) include the following: (1) all water developed by the two states in the basin prior to 1950, (2) Wyoming and Montana supplemental water rights, and (3) Northern Cheyenne Compact rights. The model adjusts streamflow records to reflect these "pre-1950" levels of use. Then, under the full Wyoming development scenarios presented in the EIS, only 60 percent of these remaining flows are assumed to be available for use in Montana.*

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altered, Wyoming would appreciate some notation that the amount does not represent a development of their full Compact share, but is an estimate of the amount of water that could be applied as supplemental supply to land with a pre-1950 original supply water right. The use of water for supplemental purposes are considered to be pre-Compact and are not considered part of the 40%-60% split between the States on the Tongue River.

Thank you for the opportunity to comment on the draft EIS. If I can provide you with anything further, please don't hesitate to contact me.

Sincerely,

Sue Lowry

Sue Lowry
Director of Policy and Administration

Encl.

cc: Gordon W. Fassett, State Engineer
Julie Hamilton, State Planning Coordinator's Office
Mike Whitaker, Division II Superintendent

Agreement

This agreement is entered into between the State of Montana and the State of Wyoming, hereinafter termed the "Parties."

WHEREAS the State of Montana and the Northern Cheyenne Tribe have entered into the Northern Cheyenne-Montana Compact (Northern Cheyenne Compact) pursuant to Montana. Code Ann. 85-20-301 (1991), in settlement of the Tribe's claims of reserved water rights in Montana, which in part allocates water to the Tribe from the Tongue River, and

WHEREAS Wyoming and its water users have existing water rights in the Tongue River Basin and have rights to future development in the basin as recognized in the 1951 Yellowstone River Compact, Act of October 30, 1951, 65 Stat. 663, and

WHEREAS the Northern Cheyenne Compact's allocation of water to the Tribe from the Tongue River is based on a water model, which is incorporated in the Northern Cheyenne Compact and this agreement by reference, and the model contains the assumption that existing and supplemental water use in Wyoming is deducted from Tongue River flows prior to the allocation of flows between Montana and Wyoming under the Yellowstone River Compact and that Wyoming's entitlements under the Yellowstone River Compact are deducted prior to the model's simulation of Tongue River reservoir operations, and

WHEREAS Wyoming water use and allocations are accounted for in the water model and, as provided by the Northern Cheyenne Compact the model cannot be changed except by mutual consent of the Northern Cheyenne Tribe, the United States, and the State of Montana,

NOW, THEREFORE, the Parties herein agree as follows:

1. The State of Montana will not consent to any change, amendment, or modification of the Tongue River Water Model that affects or may affect the right of Wyoming water users to exercise existing water rights in the Tongue River Basin or future use and development of Wyoming Tongue River Basin water rights as recognized and apportioned from the water allocated to Wyoming in the Yellowstone River Compact without prior consultation and written consent of the State of Wyoming.

2. The State of Montana will not consent to any change, amendment, or modification of the Northern Cheyenne Compact that affects or may affect the right of Wyoming water users to exercise existing water rights on the Tongue River Basin or future use and development of Wyoming Tongue River Basin water rights as recognized and apportioned from water allocated to Wyoming in the Yellowstone River Compact, without prior consultation and written consent of the State of Wyoming.

3. The Parties herein understand that the Tongue River Water Model analysis indicated future allocation of water in the Tongue River Basin provided to Wyoming under the provisions of the Yellowstone River Compact may be reduced as a result of the use of the water under the Northern Cheyenne Compact. The parties herein agree the Wyoming water rights for the use and development of Wyoming's remaining entitlements are also acknowledged through the water model analysis incorporated by reference in the Northern Cheyenne Compact.

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4. The Parties hereby affirm their intent that use of the Tongue River Model incorporated in the Northern Cheyenne Compact, and Wyoming's assent to the use of that model, shall not be deemed an admission by either Party as to the correct interpretation of the Yellowstone River Compact.

DATED this 20 day of February, 1992

Governor Stan Stephens
State of Montana

Governor Mike Sullivan
State of Wyoming

Attest:

Karen Barclay, Director
Montana Department of Natural
Resources and Conservation

Gordon W. Fassett
Wyoming State Engineer

Gary Fritz, Administrator
Water Resources Division
Montana Department of Natural
Resources and Conservation

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII, MONTANA OFFICE
FEDERAL BUILDING, 301 S. PARK, DRAWER 10096
HELENA, MONTANA 59626-0096

Ref: 8MO

August 25, 1995

Mr. Edward M. Pettit, Environmental Coordinator
Montana Dept. of Natural Resources & Conservation
1520 E. 6th Avenue
P.O. Box 202301
Helena, Montana 59620-2301

Re: Tongue River Basin Project Draft Environmental Impact Statement

Dear Mr. Pettit:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the Environmental Protection Agency, Region VIII, Montana Office (EPA) has reviewed the above-referenced Draft Environmental Impact Statement (DEIS).

The U.S. Bureau of Reclamation (USBR), Northern Cheyenne Tribe (Tribe), and the Montana Dept. of Natural Resources & Conservation (DNRC) propose to repair and enlarge the Tongue River Dam and Reservoir, provide a portion of the water allocated to the Tribe by the Northern Cheyenne Indian Reserved Water Rights Settlement Act of 1992, and preserve and enhance fish and wildlife habitats in the Tongue River Basin.

89 The EPA is supportive of addressing the Tongue River dam safety problem and protecting and maintaining water rights reserved by or granted to the Northern Cheyenne Indian Tribe. We also have responsibilities, however, to assure environmental compliance of the proposed project with NEPA and Clean Water Act (CWA) Section 404 requirements. We believe that 404 requirements should be integrated into the NEPA analysis to help avoid project delays and better assure that the agencies preferred alternative will receive a 404 permit from the Corps of Engineers.

90 As noted at an interagency meeting hosted by USBR in Billings, Montana on August 15, 1995 EPA would like to suggest an approach for addressing environmental compliance concerns. We recommend that the Purpose and Need section of the EIS be revised to indicate that the primary purpose of the project is to correct the dam safety problem, and although the Settlement Act indicated that Tribal Compact water be provided in conjunction with the dam repair, analysis of other alternatives to provide the Compact

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89 *As environmental compliance activities related to the proposed Tongue River Basin Project have progressed, the project sponsors, in cooperation with the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Montana Riparian and Wetlands Association, and the U.S. Environmental Protection Agency have furthered our efforts to satisfy project-related requirements of the Clean Water Act Section 404 (**see responses to Comment numbers 94 and 95**).*

90 *Some commenters suggested that the **Purpose and Need** section of the draft EIS be revised to indicate that the primary purpose of the project is to correct the dam safety problem of the Tongue River Dam. Revision of the **Purpose and Need** section in this manner, however, would not accurately reflect the purposes of the project as intended by Congress under NEPA or the 1992 Settlement Act. In addressing the "purpose and need" for a proposal, the Council on Environmental Quality requires each EIS to include a statement specifying, "the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action" (40 C.F.R. § 1502.13). The 1992 Settlement Act specifies multiple purposes for the project, without ranking any particular purpose as a higher priority than any other. These are the purposes and needs to which the project sponsors are responding with this project. Assertion of one purpose - dam safety - as primary, without the others, does not accurately reflect Congress' intent for the project or its intent in NEPA that the reasons behind the proposal at issue be clearly expressed.*

The 1992 Settlement Act approved the allocation of specific amounts of water to the Northern Cheyenne Tribe in return for their relinquishment of water rights reserved to them under the <u>Winters</u> Doctrine. As part of this settlement, Congress required the State to provide a certain amount of water to the Tribe, including up to 20,000 af of storage water. Congress recognized that modifications to the current Tongue River Dam would be necessary to provide this water and improve the safety of the structure to ensure the same. This is reflected in the Act which states in Section 2(a)(3) that purposes of the Tongue River Dam Project are to: provide up to 20,000 af of additional storage (as part of the implementation of the Water Rights Compact entered into by the Tribe and the State); correct Tongue River Dam safety inadequacies; and provide for the conservation and development of fish and wildlife habitat

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water must be evaluated, and a present purpose for the additional stored water in the enlarged 80,000 acre-feet of reservoir identified, and the environmental impacts associated with this purpose analyzed and disclosed. <u>The level and intensity of analysis should be proportional to the potential extent of adverse impacts. The level of documentation should reflect the significance and complexity of the impacts</u>.

The EIS should then analyze dam safety alternatives including:

91 1) Two phase construction of the project, with repair of the dam now at the present spillway elevation, and deferring raising of the spillway crest until Tribal water use has been specified.

92 2) Repair of the dam now with the four foot rise in the spillway crest, but operating the reservoir at it's pre-1978 storage capacity of 67,000 acre-feet until Tribal water use is specified, including development of a reservoir operations plan/dam release schedule and impact analysis at this capacity, and evaluating benefits and impacts of such operations. This would be similar to the current operation where efforts have been made to limit reservoir storage to 40,000 acre-feet, except instead efforts would be made to limit storage to 67,000 acre-feet. Operation of the repaired dam at its prior capacity when practical could reduce inundation impacts to the riparian and wetland complex in the Tongue River reservoir. Thus, even though the enlarged reservoir would fill to the new spillway capacity of 80,000 acre-feet when inflow exceeds outflow during certain flow events, after this inflow event the reservoir could be lowered to 67,000 acre-feet to reduce wetland and riparian impacts.

93 3) Repair of the dam now with the four foot rise in spillway crest and operating the reservoir utilizing the new 80,000 acre-feet capacity, including development of a reservoir operations/dam release schedule and impact analysis at this capacity, and evaluating benefits and impacts of such operation. While there would be larger inundation impacts and reservoir bank erosion impacts there may also be significant fisheries and other benefits associated with operations at 80,000 acre-feet.

An analysis of these alternatives could be accomplished in the Final EIS to determine the least damaging practicable alternative based on costs, technology, and logistics as specified in the 404(b)(1) Guidelines (40 CFR Part 230).

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in the Tongue River basin.[1] Public Law No. 102-374, 106 STAT.1186 (1992).[2] To restrict the purpose of the project primarily to the correction of dam safety problems might result in no increase to the storage capacity of the reservoir. Alternatives providing only for repair do not meet the needs of the project as set forth in the 1992 Settlement Act. Thus, the Purpose and Need of the project as set forth in the draft EIS remains the same.

[1] The Settlement Act also directs that other purposes of the project are implementation of the Compact's settlement of the Tribe's reserved water rights and protection of existing Tribal contract water rights in the Tongue River Basin. These purposes are not formally included in the ***Purpose and Need*** *section because they either do not require physical alteration to the Dam or are encompassed within the need for an additional storage capacity of 20,000 afy.*

[2] See also the definition of the Tongue River Dam Project, which includes "enlarg[ment]" of the dam not simply repair. Section 3(8), Public Law No. 102-374, 106 STAT.1187.

91 *The alternative you suggest has been added to the* ***Alternatives Considered but Dismissed*** *section of the final EIS (****Section 2.4****).*

92 *The alternative you suggest has been added to the* ***Alternatives Considered but Dismissed*** *section of the final EIS (****Section 2.4****).*

93 *The components of the alternative you suggest constitute the basis of both construction alternatives analyzed in the draft EIS.*

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Of course, we are in no position to second guess the outcome of the above suggested analyses. However, during the August 14, 15, 1995 interagency field trip and meeting it was suggested that the repair of the spillway at the 3,428.4 feet crest elevation (with the 4 foot rise) may have a considerable economic advantage over two phased construction, and there may be environmental, recreational, and other benefits associated with operation of the dam at the 80,000 acre-feet capacity sufficient to demonstrate that this would be the least damaging practicable alternative to provide a safe dam.

Additional explanation and information regarding our concerns about environmental compliance and our suggested approach toward potential resolution of these concerns are provided in the enclosure with this letter.

94 The EPA is also concerned that there is inadequate identification and disclosure of wetland impacts of the proposed project to enlarge the reservoir. The acreage and the function and value of wetlands impacted by the proposed project need to be specifically identified, and a wetland mitigation plan that provides adequate compensation for the loss of the functions and values of impacted wetlands must be prepared.

95 As discussed at the August 15, 1995 interagency meeting in Billings we suggest that impacts to jurisdictional wetlands may be determined most expeditiously by cross-referencing between the existing Montana Riparian Wetland Association (MRWA) riparian-wetland vegetation mapping already done (identifying 541 acres of riparian-wetland acres below elevation 3,429 feet) and Federal wetland delineation criteria. We recommend contacting the MRWA to see if MRWA staff would be available to carry out this cross-referencing to determine impacts to jurisdictional wetlands. It would appear expeditious for MRWA to carry out this work since they have understanding of both Federal wetland delineation criteria and existing riparian-wetland vegetation mapping and are familiar with the Tongue River wetlands. A wetland mitigation plan would then have to be prepared to provide adequate mitigation for the loss of functions and values of impacted wetlands.

96 We also suggest that the wetland mitigation plan be incorporated into a preliminary 404(b)(1) evaluation prepared for the preferred alternative and appended to the FEIS. This would help assure that the FEIS adequately addresses all 404(b)(1) criteria. The 404(b)(1) evaluation could then be used when 404 application to the Corps is made, to reduce delay and avoid uncoordinated, duplicative efforts.

Our concerns regarding environmental compliance and wetlands impacts as well as other comments, questions, and concerns regarding the analysis, documentation, or potential environmental

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94 *Since publication of the draft EIS in June of 1995, efforts have been underway to more specifically address project-related impacts to wetlands in the project area. In the draft EIS, the project sponsors essentially identified potentially affected acres of jurisdictional wetlands around the reservoir and committed to mitigating for the lost functions and values of those wetlands. Recent efforts by the project sponsors include working with the Montana Riparian and Wetland Association to obtain a more specific delineation of jurisdictional wetlands likely to be affected by the proposed project, assessing the functions and values of those wetlands, developing a mitigation plan specifically for those lost functions and values, and contracting for preparation of a Clean Water Act Section 404(b)(1) Guideline Evaluation of the proposed project. Preliminary results of some of these efforts are appended to the final EIS. The project sponsors' approach to wetland impacts since publication of the draft EIS has been developed in consultation with the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, and the U.S. Fish and Wildlife Service.*

95 *Since the August 15, 1995 interagency meeting in Billings, and in response to the suggestion of both EPA and COE, the project sponsors worked with the Montana Riparian and Wetland Association (MRWA) to obtain a cross-referencing between the MRWA riparian-wetland vegetation mapping effort already completed for the project area and federal wetland delineation criteria. This cross-referencing effort essentially served as a surrogate delineation (definition of the location and extent) of jurisdictional wetlands that would be affected by the proposed project. Further, MRWA's cross-referencing formed the basis for 1) the evaluation of wetland functions and values that would be lost with the proposed increase in Tongue River Reservoir capacity, 2) the development of the project sponsors' plan to mitigate for those lost wetland functions and values, and 3) the preparation of a Clean Water Act Section 404(b)(1) Guideline Evaluation of impacts related to the project. The wetlands sections of* ***Chapters 2, 3, and 4*** *include the results of these undertakings.*

96 ***See responses to Comment numbers 94 and 95.***

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impacts of the Tongue River Basin Project DEIS are further described in an enclosure with this letter.

97 Based on the procedures EPA uses to evaluate the adequacy of the information and the potential environmental impacts of the proposed action and alternatives in an EIS, the Tongue River Basin Project DEIS has been rated as Category EC-2 (Environmental Concerns - Insufficient Information). A copy of EPA's rating criteria is attached.

98 As can be seen from the enclosed comments, we are concerned about environmental compliance, the project purpose and alternatives analysis, and the lack of detailed information regarding wetlands impacts and mitigation. We believe additional information is needed to fully assess and mitigate all potential environmental impacts of the management actions. EPA intends to work with the project sponsors to resolve these matters.

The EPA appreciates the opportunity to review and comment on the DEIS. If we may provide further explanation of our concerns please contact Mr. Steve Potts of my staff in Helena at (406) 449-5486 ext. 232.

Sincerely,

John F. Wardell
Director
Montana Office

Enclosure

cc: Bill Geise/Arlene Butler, EPA 8WM-EA, Denver
Dick Sanderson, EPA-OFA, Washington DC
CEQ, Elizabeth Blaug, Washington DC
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Steve Oddan, USFWS, Billings
Mark Albers/Brenda Schilf, USBR, Billings
Ernie Robinson/Jason Whiteman, Northern Cheyenne Tribe, Lame Deer
Don Hyyppa, MDFWP, Miles City
Liter Spence, MDFWP, Helena

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97 *Comment noted.*

98 *Comment noted.*

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ENCLOSURE

EPA Detailed Comments on Tongue River Basin Project Draft Environmental Impact Statement

BRIEF PROJECT OVERVIEW:

The U.S. Bureau of Reclamation (USBR), Northern Cheyenne Tribe (Tribe), and the Montana Dept. of Natural Resources & Conservation (DNRC) propose to repair and enlarge the existing unsafe Tongue River Dam and Reservoir, provide a portion of the water allocated to the Tribe by the Northern Cheyenne Indian Reserved Water Rights Settlement Act of 1992, and preserve and enhance fish and wildlife habitats in the Tongue River Basin.

The dam is currently in an unsafe condition because the probable maximum flood has the potential to exceed the capacity of the spillway and overtop the dam. The Dam has been designated a "high hazard dam" by the Corps of Engineers and the Forest Service, because failure of the dam would threaten life and property. Since 1978 the dam has been operated at a reduced reservoir level reservoir that only provides 20,000 acre-feet of storage until after peak runoff has passed, after which reservoir storage has been limited to 40,000 acre-feet due to the unsafe condition of the spillway.

The Northern Cheyenne Indian Reserved Water Rights Settlement Act of 1992 (P.L. 102-374) ratified the Montana Reserved Water Rights Compact Commission agreement between the State of Montana and Northern Cheyenne Tribe for the planning, environmental compliance, design, and construction of the Tongue River Dam project. This Settlement Act included agreement to provide 20,000 additional acre-feet per year of additional storage water for allocation to the Tribe; allowed the State to correct dam safety inadequacies; and to preserve and enhance fish and wildlife habitats in the Tongue River Basin.

The USBR was directed to assume lead federal agency responsibility for environmental compliance activities on the Tongue River Basin Project. The DEIS states that from the federal perspective the need for the project is to maintain and protect; tribal water rights recognized in the Montana Reserved Water Rights Compact; tribal life and lands endangered by the unsafe Tongue River Dam located upstream of the Reservation; and to preserve and enhance fish and wildlife resources and habitat in the Tongue River Basin that have suffered as a result of human development of the area.

The purpose for the State of Montana is to maintain the ability to deliver all existing water use contracts held in the Tongue River Reservoir; provide a safe dam, and provide increase reservoir storage that, in combination with exchange water and

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existing unallocated reservoir storage, would allow the delivery of up to an additional 20,000 acre-feet per year of water to the Tribe. The Tribe has an existing water purchase contract with the State for 7.500 acre-feet per year.

The USBR, DNRC, and Tribe evaluated two action alternatives, Alternative 1, Labyrinth Weir Spillway, and Alternative 2, Roller Compacted Concrete (RCC) Spillway, and no action, Alternative 3.

The preferred alternative, Alternative 2, Roller Compacted Concrete (RCC), would replace the existing primary spillway at the Tongue River Dam with a new 190 feet wide reinforced concrete spillway tapering to 100 feet wide at the toe of the dam, with a spillway crest 4 feet higher than the existing crest. In addition a RCC spillway would be built over the modified dam embankment. The RCC spillway would have two components a secondary spillway at 3,429.4 feet and an emergency spillway at 3,431.4 feet. The three spillways at three different elevations would accommodate the 100,000 cfs spillway design flood. Alternative 2 would also include repair or replacement of the existing lower level works, and construction of a new auxiliary low level outlet works.

Alternative 1, Labyrinth Weir Spillway, would replace the existing spillway with a 250 foot wide labyrinth weir spillway with a chute and a stilling basin at the bottom; repair or replacement of the existing lower level works; and construction of a new auxiliary low level outlet works. The labyrinth weir design is the most efficient crest design allowing the 100,000 cfs spillway design flow with the primary spillway. The labyrinth design allows significantly higher peak flood flows in the river below the dam.

Both action alternatives also include an identical program to enhance fish and wildlife habitats in the Tongue River Basin from the Montana-Wyoming border to the confluence of the Tongue and Yellowstone Rivers at Miles City, Montana. The Northern Cheyenne Indian Reserved Water Rights Settlement Act of 1992 allocated $4.6 million for enhancement of fish and wildlife habitat in the Tongue River Basin ($3.5 million federal funds and $1.1 million state funds).

COMMENTS:

99 1. The DEIS does not adequately explain the need for the proposed additional storage volume in the Tongue River Reservoir. Since existing Tongue River Reservoir water rights and contracts are only shown to be 40,000 acre-feet (i.e., 32,500 acre-feet to Tongue River Water Users Association (TRWUA), and 7,500 acre-feet to the Tribe) it would appear that repair of the dam to restore pre-1978 reservoir capacity of 67,000 acre-feet from the present 40,000 acre-feet operating capacity (reservoir storage has been

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99 *The firm annual yield of any reservoir is not equal to its storage capacity. Although the existing full pool capacity of the Tongue River Reservoir is 67,000 af, the firm annual yield of the reservoir only at this capacity is about 47,000 afy (**see response to Comment number 165** for a discussion of firm annual yield). Increasing reservoir capacity to 80,000 af, as proposed, would boost the firm annual yield to about 54,000 afy.*

There are existing contracts for 40,000 afy of Tongue River Reservoir water. Additionally, up to 20,000 afy of stored water is required by the Northern Cheyenne Compact, so future maximum reservoir demands would be 60,000 afy. During most years, there would be sufficient water in the expanded reservoir to supply all existing contracts and the Tribe's stored water rights. However, shortages will occur during very dry years.

*The Compact has stipulations addressing water shortages. It states that the Tribe can incur shortages, but that they will not exceed 50 percent of the total right in any one year, or 100 percent of the right cumulatively in any 10-year period. Results from the Tongue River water model for the construction alternatives indicate that, during the 45-year period modeled, shortages occurred but the shortage criteria in the Compact were not violated. **Section 2.2 of the final EIS** has been changed to more accurately depict the criteria (including hydrologic considerations regarding Tongue River Reservoir firm annual yield) used during development of alternatives.*

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limited to 40,000 acre-feet due to the unsafe condition of the spillway, although in times of high inflows higher reservoir storage has occurred) would add 27,000 acre-feet in storage capacity and allow the Tribe to obtain its 20,000 acre-feet of Compact water.

We have been advised, however, that simple repair of the dam to restore pre-1978 capacity will not provide a dependable enough water supply in drought years and will not meet water shortage criteria in the Compact. We recommend that the FEIS better discuss and display information regarding the Compact negotiations, specifically including; discussion of water shortage criteria; firm annual yield vs. reservoir storage capacity; delivery of water with adequate degree of dependability, etc. This will better explain to the public why simple repair of the dam/spillway will not satisfy tribal Compact water needs, and why 80,000 acre-feet of reservoir storage is needed to supply 60,000 acre-feet of water demands.

100 2. The alternatives considered but dismissed from detailed analysis in the DEIS focus on repair of the dam and acquisition of an additional 20,000 acre-feet of water to satisfy Compact water requirements. However, it appears that it would be more appropriate to evaluate alternatives that focus on repair of the dam and acquisition of only 8,000 acre-feet of water, since repair of the dam will provide 32,000 acre-feet of the Tribes needs of 40,000 acre-feet (i.e., 7,500 acre-feet existing contract + 12,500 acre-feet of Compact direct flow rights + 20,000 acre-feet of Compact storage water = 40,000 acre-feet).

It may be that an alternative of repair of the dam and obtaining an additional 8,000 acre-feet on a firm annual yield basis, through additional on or off stream storage, purchase, cash settlement, etc., or a combination of these would be a reasonable and environmentally sound alternative that should be explored and evaluated in the EIS.

101 3. Enlargement of the reservoir would result in adverse impacts associated with inundation of wetlands and loss or modification of wetland functions and values, and additional reservoir shore/bank erosion, and also potentially result in additional adverse impacts associated with new water uses (e.g., impacts of new reservoir operations and flow releases on Tongue River aquatic life; impacts of irrigation diversions on river stability and aquatic habitat; soil leaching and water quality impacts of irrigation; impacts of irrigation return flows on receiving drainage stability and channel erosion; etc.). <u>The potential impacts associated with new water use and increased reservoir storage are presently undetermined.</u>

The DEIS states that the timing, extent, and nature of Tribal use of the additional 20,000 acre-feet of stored water per

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100 *The project sponsors sent a questionnaire to all irrigation water right and water contract holders along the Tongue River asking them if they would be willing to sell their water rights or contracts. Of the 172 questionnaires sent out, 120 were returned. Only 5 of the 120 respondents indicated that they would consider selling their water rights or contracts. These 5 respondents had rights or contracts to about 400 afy of water total. The alternative of purchasing water rights from willing sellers was dismissed for this reason (**see Section 2.4 of the EIS**). It was not dismissed on the basis that 20,000 afy of water would need to be purchased.*

*Developing another on-stream storage project, regardless of its size, would cost considerably more than raising the existing spillway crest 4 feet. Any dam constructed on the Tongue River would require a large spillway capable of passing high floods. As shown in **tables 2-6 and 2-4**, spillways are expensive to construct, and the unsafe spillway at the existing dam would still have to be repaired. This alternative was dropped because the costs of building another dam, while at the same time repairing the spillway at the existing dam, would be too high. Substantial environmental impacts also would be associated with the construction of another dam on the Tongue River.*

Developing an off-stream storage project to provide the additional water required by the Settlement Act was dropped for similar reasons. No suitable sites have been identified for off-stream storage of Tongue River flows. Storing water in two small reservoirs on Pumpkin Creek, a larger Tongue River tributary, was investigated but dismissed as an option. Reservoirs would store about 7,600 af, but their firm annual yield would be considerably less. The projects also would be expensive and have environmental impacts.

Storing water in abandoned coal mines was dismissed as an option because there are legal requirements that coal mined lands be reclaimed. Also, it is unlikely that abandoned mines could provide water of sufficient quantity and quality.

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year is unknown at this time (page 4-67). EPA believes adverse impacts should not occur without more detailed assessment and disclosure of the uses for the additional water to be stored in the reservoir. We believe the uses of additional stored water in the enlarged 80,000 acre-feet of reservoir should be identified, and the environmental impacts associated with these uses analyzed and disclosed to satisfy the requirements of NEPA and Section 404 of the Clean Water Act (CWA).

We are concerned that deferral of the environmental impact analysis of future uses of water stored in the reservoir until after enlargement of the reservoir may limit the choice of reasonable and practicable alternatives, and is contrary to the NEPA intent that environmental consequences of an action are analyzed **before** a decision is made, and **before** adverse impacts occur, and that officials make decisions based on understanding of the environmental consequences of the action (40 CFR 1506.1(a)).

Also, the CWA Section 404 permitting process requires compliance with the 404(b)(1) Guidelines (40 CFR Part 230), which contain the substantive environmental criteria used by the Corps and EPA to evaluate discharges of dredged or fill material. A fundamental precept of the guidelines is that dredged or fill material should not be discharged when less damaging practicable alternatives are available. The environmental impacts and the purpose of proposed dredge and fill activities must be identified and evaluated to allow determination of the least damaging practicable alternative. Without appropriate information on reservoir water uses insufficient information exists to make a reasonable judgement as to whether the project would comply with the 404(b)(1) Guidelines. Under such circumstances a 404 permit must be denied (40 CFR 230.12(a)(3)(iv)).

We note that the Northern Cheyenne Indian Reserved Water Rights Settlement Act of 1992 (P.L. 102-374) acknowledges:

> "In implementing the Compact, the Secretary shall comply with all aspects of the National Environmental Policy Act of 1969, ... and other applicable environmental Acts and regulations."

Although the Settlement Act specified that additional Tribal Compact water be provided through additional storage in the Tongue River reservoir, a purpose and use of additional stored water must be identified, and an environmental impact analysis for the uses of the additional stored water must still be conducted to comply with NEPA and the CWA.

The President's Council on Environmental Quality (CEQ) recognized that a potential conflict with local or federal law does not necessarily render an alternative unreasonable although

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Importing 8,000 afy of water annually from another watershed would require a large 60-mile pipeline. This proposal was dismissed as an alternative way of supplying the Tribe with additional water because of the expense and the environmental impacts such a project would have.

Repairing the dam and giving the Tribe a cash settlement was rejected because the Settlement Act requires that the Tribe receive additional water. The Tribe is not interested in a cash compensation.

Bedrock aquifers in the area have little potential to provide thousands of acre-feet of suitable quality water annually to the Tribe, and therefore were not considered an option to raising the dam. Similarly, the alluvial aquifers adjacent to the Tongue River could yield several thousand acre-feet of water per year, but probably would reduce streamflow and riparian plant communities.

101 ***See Section 4.24 of this final EIS*** *for more specific information regarding the Tribe's use of its Compact water. Further,* ***see Section 4.8.1 of this final EIS*** *for a discussion of impacts to jurisdictional wetlands around the reservoir, and how those impacts are unrelated to the increased impoundment necessary to satisfy the Tribe's Compact water right.*

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such conflicts must be considered (40 CFR 1506.2(d)). According to CEQ: "Alternatives that are outside the scope of what Congress has approved or funded must still be evaluated in the EIS if they are reasonable, because the EIS may serve as the basis for modifying the Congressional approval or funding in light of NEPA's goals and policies" (46FR18026, 3/23/81).

The EPA believes that the interests of all parties can best be served if it is assured that the project, and the procedures used by the project sponsors, particularly the U.S. Bureau of Reclamation (USBR), which is responsible for environmental compliance, are consistent with NEPA and CWA provisions and environmental protection.

101b As noted at an interagency meeting hosted by USBR in Billings, Montana on August 15, 1995 EPA would like to suggest an approach for addressing environmental compliance concerns. We recommend that the Purpose and Need section of the EIS be revised to indicate that the primary purpose of the project is to correct the dam safety problem, and although the Settlement Act indicated that Tribal Compact water be provided in conjunction with the dam repair, analysis of other alternatives to provide the Compact water must be evaluated, and a present purpose for the additional stored water in the enlarged 80,000 acre-feet of reservoir identified, and the environmental impacts associated with this purpose analyzed and disclosed in order to satisfy the requirements of NEPA and Section 404 of the Clean Water Act (CWA).

The EIS should then analyze dam safety alternatives including:

1) Two phase construction of the project, with repair of the dam now at the present spillway elevation, and deferring raising of the spillway crest until Tribal water use has been specified.

2) Repair of the dam now with the four foot rise in the spillway crest, but operating the reservoir at it's pre-1978 storage capacity of 67,000 acre-feet until Tribal water use is specified, including development of a reservoir operations plan/dam release schedule and impact analysis at this capacity, and evaluating benefits and impacts of such operations. This would be similar to the current operation where efforts have been made to limit reservoir storage to 40,000 acre-feet, except instead efforts would be made to limit storage to 67,000 acre-feet. Operation of the repaired dam at its prior capacity when practical could reduce inundation impacts to the riparian and wetland complex in the Tongue River reservoir. Thus, even though the enlarged reservoir would fill to the new spillway capacity of 80,000 acre-feet when inflow exceeds outflow

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101b *See response to Comment number 90.*

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capacity during certain flow events, after this inflow event the reservoir could be lowered to 67,000 acre-feet to reduce wetland and riparian impacts.

3) Repair of the dam now with the four foot rise in spillway crest and operating the reservoir utilizing the new 80,000 acre-feet capacity, including development of a reservoir operations/dam release schedule and impact analysis at this capacity, and evaluating benefits and impacts of such operation. While there would be larger inundation impacts and reservoir bank erosion impacts there may also be significant fisheries and other benefits associated with operations at 80,000 acre-feet.

An analysis of these alternatives could be accomplished in the Final EIS to determine the least damaging practicable alternative based on costs, technology, and logistics as specified in the 404(b)(1) Guidelines (40 CFR Part 230).

Of course, we are in no position to second guess the outcome of the above suggested analyses. However, during the August 14, 15, 1995 interagency field trip and meeting it was suggested that the repair of the spillway at the 3,428.4 feet crest elevation (with the 4 foot rise) may have a considerable economic advantage over two phased construction, and there may be environmental, recreational, and other benefits associated with operation of the dam at the 80,000 acre-feet capacity sufficient to demonstrate that this would be the least damaging practicable alternative to provide a safe dam.

We recognize this approach will generate considerable additional tasks for the project sponsors. However, we believe this approach addresses the concern about the present undetermined environmental impacts of the proposed action, and will allow for 404(b)(1) compliance evaluation.

102 4. It is stated (page 4-9) that water development by the Tribe and Wyoming is discussed in greater detail under the Fulfillment of Settlement Act Water Rights in the Tongue River Basin. That section of the DEIS, however, comprises only one and one half pages (i.e., pages 4-67, 68), and does not include adequate information to assess environmental impacts.

The DEIS states (page 4-67) that the most likely use of the Tribe's water right would include use of water for irrigation within the basin, sale to other irrigators in the basin, and lease of water to the State of Montana to supplement instream flows. Impacts of this increased reservoir water storage and Tribal water use are assessed by developing high and low water use scenarios (page 4-67). The high water use scenario would have the Tribe use all the 20,000 acre-feet of stored water within 1 year or irrigation season. The low use scenario would

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102 ***See response to Comment number 101.***

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have the Tribe leave the 20,000 acre-feet in the Reservoir or used to a small degree to supplement low flows in the Tongue River below the dam.

We believe more complete identification of these water uses by the Tribe and a more detailed environmental impact analysis of uses is needed. As noted in comment #3 above, assessment of the reasonably foreseeable significant adverse impacts of the water use aspects of the project is needed to allow the environmental consequences of an action to be analyzed before the decision on the action is made. We believe a more detailed and thorough analysis of potentially significant adverse impacts associated with the present Tribal water uses should be carried out and disclosed in the FEIS.

103 We are particularly concerned about the cumulative effects of the high Tribal water use scenario along with other water use in the basin (full Wyoming development) that the DEIS states could have "major and significant impacts" (page 4-68), potentially producing "dramatic fluctuations in reservoir and river flow levels." The effects of such dramatic fluctuations on the aquatic ecosystem are not well described in the DEIS.

Even though the BIA will conduct an impact analysis on specific water uses when BIA actions to implement specific uses are proposed, an impact analysis of the present uses of the additional stored water should be carried out at this time. The level and intensity of analysis should be proportional to the potential extent of adverse impacts. The level of documentation should reflect the significance and complexity of the impacts.

104 For impact analysis of irrigation use the FEIS should evaluate information such as the probable location of irrigated lands (maps would be helpful); soil types in irrigated areas; likely crops to be irrigated; proposed irrigation water management systems; irrigation timing; impacts of return flows in regard to water quality leaching effects, sediment transport, receiving stream/drainage stability, etc.; conveyance systems; locations and effects of diversions; likely reservoir releases schedules to deliver water to irrigated areas; fluctuations in reservoir water levels and effects of such fluctuations; effects upon river ecology, permits that may be necessary to effect water use; etc.,.

105 The proposed lease of water to the State of Montana to supplement instream flows should also be further discussed and analyzed, including the possible mechanisms to implement fisheries enhancement (e.g., tribal water reservation, sale or exchange, agreement w/ MDFWP, etc.). We believe such uses (particularly to address dewatering problems below the T&Y diversion) offer great potential to demonstrate environmental benefits of the proposed project that can be weighed against

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103 ***See Section 4.25 of the EIS*** *for information regarding the cumulative impacts of potential Tribal water use scenarios and Wyoming water development.*

104 ***See Section 4.24 of the EIS*** *for information regarding Tribal Compact water use and its associated impacts.*

105 *The Tribe has identified its present and reasonably foreseeable future use of Compact water as fish, wildlife, and recreation purposes in the reservoir and downstream. A programmatic evaluation of potential impacts of this use is included in* ***Section 4.24.2*** *of this final EIS (under the* **Tribal Instream Flow Development Water Use Scenario***).*

DFWP and the Tribe have held preliminary discussions concerning a possible lease of stored water provided in the Compact for use to supplement instream flows. If such a lease were to take place, it would first have to be approved under terms of the soon to be adopted Tribal Water Code. Until the Tribal Water Code is adopted, such a lease would have to be approved by the Secretary of the Interior.

Negotiations to finalize detailed terms of an instream flow lease have not been completed as of early 1996. Exact delivery locations, schedules, and costs would have to be finalized before the approval process could begin. If an instream flow lease is negotiated and approved, formal analysis of associated environmental impacts would be required.

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adverse impacts. We encourage the Tribe to further pursue instream flow discussions with the Montana Dept. of Fish, Wildlife & Parks and better quantify and describe details of potential instream flow uses in the FEIS. Specific identification and analysis of such instream flow uses for additional stored water may contribute towards determination that construction and operation of an enlarged reservoir may be the least damaging practicable alternative in the 404(b)(1) evaluation.

We should note that environmental impact analysis of the likely uses of additional stored water at this time does not preclude further refinement and addition to or revision of the impact analysis at the time future BIA actions, and perhaps future Corps permits, may be proposed when more specific use information is known.

106 5. It is stated (page 4-16) that two scenarios are presented for Wyoming's use of Yellowstone Compact water. The DEIS reader is then referred to the section on the Fulfillment of Settlement Act Water Rights in the Tongue River Basin. That section of the DEIS, however, as stated previously is brief, and does not include much information on the Yellowstone Compact.

It states that the existing condition is for no further development of Wyoming's Yellowstone Compact water. The second scenario is for full development of Wyoming's Yellowstone Compact water. It is stated that historic conditions should be compared to the proposed condition with no Wyoming development to isolate the differences attributed to the project. Wyoming water rights under the Yellowstone River Compact, however, are not described in the DEIS. Development of Wyoming water rights under the Yellowstone River Compact should be more fully and clearly described. It may be that explanation and disclosure of the effects of full development of Wyoming's Yellowstone Compact water will help identify benefits associated with the proposed reservoir enlargement (i.e., ameliorating reservoir and downstream dewatering resulting from Wyoming water development).

107 6. Review of the minimum and maximum reservoir level data in Appendix E, Table E-3, shows greater fluctuations than shown by the monthly median hydrologic data in Figure 4-4 (e.g., Table E-3 shows levels varied by 58.3 feet from minimum level of 3,370.1 to 3,428.4 vs. seasonal variation by approximately 22 feet from 3,398 elevation in January to 3,420 elevation in June according to Figure 4-4). The anticipated monthly median pool levels shown in Figure 4-4 appear to be more stable than historic levels, with or without Wyoming water development. For example reservoir levels vary seasonally by approximately 7 feet (from 3,421 elevation to 3,428 elevation), and 16 feet (from elevation 3,412 to 3,428 elevation) with and without Wyoming water development.

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106 ***See Section 4.25 of the final EIS*** *for a discussion of the Yellowstone River Compact and its associated impacts.*

107 *The minimum and maximum reservoir level data in* ***Appendix E,*** *represent extreme conditions that would occur during a 44-year period. The monthly median reservoir elevations in* ***Figure 4-5*** *represent reservoir elevations by month during a typical year. As one can expect, fluctuation extremes over a 44-year period are greater than typical annual fluctuations. It is anticipated that pool levels following construction will generally be higher and more stable than in the past. However, substantial pool fluctuations will still occur, especially during drought years. This is disclosed in* ***Section 4.7.1.1 of the EIS****. The ecological and erosional effects of these fluctuations are discussed in* ***Chapter 4 of the EIS****.*

The minimum and maximum pool elevations from past years are from end-of-the-month reservoir elevation observations. Tongue River Reservoir elevations are not monitored daily.

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Are the historic minimum and maximum pool elevations based on daily observations? Would it be correct to say that in general seasonal reservoir pool levels will be higher and more stable (i.e., fluctuate less on a seasonal basis) after implementation of the proposed project (as implied by review of monthly median data)? It still appears, however, that minimum and maximum seasonal pool level variations may still be potentially very high with the proposed new operations. Have the ecological and erosional effects of these proposed fluctuations been fully disclosed?

108 7. Large reservoir fluctuations do not seem to be revealed in Figure 4-4 that shows proposed reservoir elevations historically, with full Tribal water use and no Wyoming development, and with both full Tribal and Wyoming water development. In fact, the most stable reservoir levels are those shown for full Tribal water development. This seems to be inconsistent with the statement in the in the DEIS (page 4-67) that the high use scenario would result in great reservoir fluctuations.

109 8. The historic minimum pool level is shown in Table E-3 to be 3,370.7 feet. What was the reservoir storage volume at the minimal pool elevation of 3,370.7 feet? Under what circumstances did this minimal pool level occur? For what duration did it occur? What effect did this minimum reservoir level have on fisheries and aquatic life?

110 9. The minimum reservoir pool level with the proposed operations is shown in Table E-3 to be elevation 3,374.4 feet. What would the reservoir storage volume be at the minimal pool elevation of 3,374.4 feet? Under what circumstances is it anticipated that this minimal pool level would occur? For what duration would such a low level occur? What effect would this minimum level have on fisheries and aquatic life?

111 10. Figure 4-6 showing monthly median streamflow dam releases during construction show minimum monthly median streamflow to be no lower than historic minimums of 190 cfs. Yet Table E-7 shows potential streamflows below 100 cfs during construction. Under what circumstances are such low streamflows anticipated? Would these low flows still be anticipated with the auxiliary low level outlet works?

112 11. Figure 4-8 shows proposed monthly median dam releases following construction to closely track historic releases. Table E-8, however, shows potential future minimum streamflows of 13 cfs, and Table E-9 shows potential dewatering of the river (with full Wyoming water development). Under what circumstances are such low streamflows anticipated? Why would these proposed future minimum streamflows after repair of the dam and increase in storage capacity of the reservoir be lower than historic minimum flows?

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[108] ***Figure 4-5*** *shows monthly reservoir elevations under various scenarios for a "typical" (median) year. As you correctly point out, the "high use" scenario does not result in greater reservoir fluctuations than those occurring under historic conditions. In fact, the Tribal "high use" scenario results in more stable and higher reservoir elevations.* ***Section 4.24 of the final EIS*** *has been changed to reflect this fact.*

[109] *As shown in* ***Appendix E of the EIS****, when the reservoir elevation was 3,370.1 feet, the volume of water in the reservoir was 800 af. This occurred in 1960 when end of month reservoir contents declined from 27,500 af in June to 800 af in September. Reservoir contents remained very low (900 af) in October and the reservoir slowly refilled, reaching 22,600 af by March 1961.*

June(1960)	July	August	September	October	November	December	January (1961)	February	March
27,500	16,400	5,800	800	900	4,100	7,200	7,200	16,500	22,600

No records indicate how the fishery responded to this drawdown. The reservoir had been rehabilitated in 1957 and was still being managed as a trout fishery in 1960 (Stewart 1995). Many of the trout probably were washed through the reservoir outlet as the average depth of the reservoir was less than 4 feet.

[110] *As indicated in* ***Appendix E of the EIS****, reservoir contents would be 1,500 af when the reservoir elevation is at 3,374.4 feet. Low reservoir levels such as this could occur during a series of drought years. A chronological sequence of how such a situation might occur is as follows: (1) The reservoir fills during the spring of the first year, but summer inflows are low and irrigation demands are high. (2) By the end of September of year one, about 55,000 af of stored water have been released from the reservoir to supply irrigation demands, leaving about 20,000 af in the reservoir. (3) Dry conditions continue through the fall and winter, and inflows are so low that additional stored water is released to maintain a minimum flow in the Tongue River downstream. (4) By the beginning of spring runoff of year two, reservoir contents are at 15,000 af, the snowpack is low, and the Tongue River valley is dry. (5) Spring runoff is insufficient to both fill the reservoir and supply downstream irrigation demands. Reservoir contents at the end of June are 50,000 af. (6) Dry conditions continue and summer irrigation demands are high. By the end of September, most stored water has been released and the reservoir is down to a dead storage volume of 1,500 af.*

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12. It is not clear how additional water development for Wyoming water rights can be considered if the 60,000 acre-feet of demands to be met with the reservoir operation plan are already fulfilled by existing contracted water and new compact water to the Tribe? With 80,000 acre-feet reservoir storage capacity only 20,000
113 acre-feet of water remain, and minimal reservoir water level considerations for recreation, fish, and wildlife will need to be provided for. We have been advised verbally that the project sponsors will consider establishment of a minimum reservoir pool. We encourage inclusion of a minimum pool as a mitigation measure in the FEIS.

13. Enhancement of fish and wildlife habitat is stated in the DEIS to be one of the purposes of the proposed project (page 1-4). We understand that the commitment for project habitat improvement involves a planned $4.6 million enhancement effort.
114 However, only general information about this enhancement program is included in the DEIS. What is the status of this program? What options are available for this activity and will this important environmental component of the project be completed prior to project construction?

We believe that the agencies should develop and propose more specific fish and wildlife habitat enhancement projects and describe them in the FEIS so that their adequacy can be evaluated, and commitments to implement appropriate mitigation measures included in the FEIS. We also believe that implementation of these habitat enhancement projects should occur concurrently with the dam repair, otherwise there may be a risk of losing support and funding for fish and wildlife habitat enhancement.

14. It is stated in Table 2-7, page 2-71, that impacts on wetland acreage from increased inundation are "negligible in the short and long terms". We understand, however, that the proposed 4 feet rise in reservoir height will inundate an additional 414 acres (page 4-9). It is further stated in the DEIS (page 3-11)
115 that a 1992 vegetation report prepared by the Montana Riparian Wetland Association (MRWA) identified 541 acres of riparian-wetland habitat types in the reservoir area below elevation 3,429 feet would be affected by the project. Project sponsors estimate that 5 to 25 percent of these 541 acres would be delineated as "jurisdictional wetlands" under the 1987 Corps of Engineers Wetlands Delineation Manual (27 to 135 acres).

On what basis can a statement that wetland impacts are "negligible" be substantiated? The DEIS does not include adequate information to describe the specific impacts to wetlands, and an adequate plan to mitigate those impacts.

A Clean Water Act (CWA) 404 permit for placement of dredged or fill material in the waters of the United States, including

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The reservoir could remain at dead storage throughout the fall and winter if inflows remain too low to allow water to be stored. The pool would build up again the following spring if conditions of the past are repeated, and, given historical records, the reservoir probably would refill the second year. Low reservoir levels would occur more frequently if Wyoming develops more water in its portion of the Tongue River basin.

Such low pool levels would reduce the surface area and average depth of the reservoir causing crowding and increased predation. Additional fish would be lost through the outlet. The reservoir would produce fewer food organisms and there would be more competition for whatever food is produced. Growth rates of reservoir fish probably would slow. Game fish populations would take several years to recover from a severe drawdown unless restocking efforts were undertaken. Drawdown might occur in subsequent years before the fish population could fully recover, further hindering recovery. ***See Section 4.9 of the EIS*** *for additional information regarding impacts to aquatics.*

Reservoir operators could designate a minimum reservoir pool. However, the Tribe and water users would incur greater irrigation water shortages during droughts if a minimum pool were designated.

111 ***Figure 4-7*** *shows streamflows that would occur during construction for a typical year. If the summer during peak construction turned out to be dry (as represented by the 80th percentile), substantially lower streamflows could be anticipated as shown in* ***Appendix E*** *and explained in* ***Section 4.7.1.2 of the EIS****. Occasionally, flows downstream of the dam have dropped below 100 cfs (****see Appendix E****).*

Low streamflows during construction are a possibility with or without a new low-level outlet works. A coffer dam will be required during construction of either the labyrinth weir or RCC alternatives. Only 30,000 af is proposed to be stored during construction with the labyrinth weir alternative compared to 45,000 af with the coffer dam under the RCC alternative. The existing reservoir capacity is 67,000 af. DNRC proposes never to drop the reservoir pool below approximately 9,000 af during construction. If construction occurs during a dry year when inflows are low and crop demands are high, the available stored water will be exhausted. Once the storage drops to 9,000 af, reservoir releases will be regulated to equal what little water is flowing into the reservoir.

Comment Number

wetlands, is likely to be required by the U.S. Army Corps of Engineers to implement the proposed project. As noted previously, the 404(b)(1) Guidelines provide the substantive environmental criteria used by the Corps and EPA for review of proposed dredge and fill activities. The EIS should address the relevant provisions of the Guidelines to determine whether the project complies with the Guidelines. The level of documentation should reflect the significance and complexity of the project. This documentation needs to address both individual and cumulative impacts.

We recommend that the project sponsors prepare a draft 404(b)(1) evaluation of proposed dredge and fill activities for the preferred alternative and include the draft 404(b)(1) evaluation in an appendix to the FEIS. This would help assure that the FEIS adequately addresses 404(b)(1) criteria. The 404(b)(1) evaluation could then be used when 404 application to the Corps are made, to reduce delay and avoid uncoordinated,
115a duplicative efforts. We also note that the CEQ regulations encourage cooperative efforts and integrating requirements of NEPA with other environmental review procedures to assure that such procedures are consistent and run concurrently rather than consecutively. We encourage you to contact the Corps of Engineers to seek further guidance regarding preparation of an adequate 404(b)(1) evaluation.

A particularly important element of Tongue River Basin Project mitigation will be mitigation of impacts to wetlands. National Wetlands Policy provides for a goal of "no net loss" of the Nation's remaining wetlands, and a long-term goal of increasing the quality and quantity of the Nation's wetlands resource base. Dredging or filling of wetlands during construction, and/or impacts to wetlands from increased reservoir pool levels and modified dam/reservoir operations, including effects of dam releases, and drawdown schedule should be evaluated for wetlands impacts. The wetlands evaluation as noted above should follow a sequence of first avoiding impacts to wetlands to the maximum extent practicable, then minimizing impacts as much as possible, and lastly, providing compensation for unavoidable impacts to wetlands. Documentation of the efforts to avoid and minimize wetlands impacts should be demonstrated in the 404(b)(1) evaluation. Mitigation efforts directed at providing compensation for unavoidable impacts to wetlands should also be described.

The acreage, and the function and value of wetlands that will be impacted by the Tongue River Basin Project should be more specifically assessed and identified. This is needed to provide the basis for development of an acceptable wetland mitigation plan. The goal of wetlands mitigation should be to replace the functions and values of unavoidably lost wetlands.

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112 *Under existing conditions, inflows to the Tongue River Reservoir can drop very low during the fall and winter of drought years. If Wyoming develops all water available to it through the Yellowstone Compact, reservoir inflows would be reduced substantially. During a series of drought years, the effect of the drop in inflows would be magnified and reservoir levels would reach very low levels at the end of an irrigation season. To ensure that the reservoir fills for the next irrigation season, winter inflows would have to be held in the reservoir. Under these circumstances, the model suggests zero outflows from the reservoir could occur.*

In reality, the reservoir will be operated by humans, not computers. Reservoir operators would not be likely to let outflows drop to zero for an extended period. Still, the model results demonstrate that, if both the Northern Cheyenne Tribe and Wyoming develop all water available to them, the water supply in the basin will be tighter in the future than today even when the reservoir capacity is increased to 80,000 af.

113 *With a rehabilitated dam, Tongue River Reservoir will have enough storage to satisfy all existing uses and Tribal compact rights (**see response to Comment number 99**). To arrive at these yields, the Tongue River Model considers reservoir inflows after subtracting full Wyoming development. Establishing a minimum pool requirement at Tongue River Reservoir would be the responsibility of the reservoir operating committee described in the **response to Comment number 10**.*

114 *Enhancement of fish and wildlife resources and habitat in the Tongue River basin is indeed an important component of the project. An interagency planning team is working to identify potential project areas and features. This planning effort will continue after publication of the final EIS and initiation of spillway construction. All proposals requiring NEPA compliance will receive full analysis and compliance when they are proposed. Any proposals requiring actual construction will be planned, as much as possible, to coincide with spillway construction in order to take advantage of potential cost savings. The federal portion of the funding for enhancement will be allocated to the Tribal Development Fund prior to its actual use. This should ensure the availability of the funding prior to its need.*

Comment Number

Different wetland types provide different functions; for example a scrub-shrub wetland may provide excellent wildlife habitat, while an emergent wetland along the shores of a reservoir or river may provide good fisheries rearing habitat and flood storage. While most wetlands provide some valuable function, each provides a somewhat unique mixture of functions and values. For example, scrub-shrub wetlands that may be inundated should not compensated for by the creation of emergent wetlands. Scrub-shrub wetlands generally provide good nesting and feeding habitat for a variety of wildlife species. The species that utilize these scrub-shrub wetlands could not simply relocate to the newly created emergent wetlands; rather there would be a loss of wildlife habitat for those species that depend upon the scrub-shrub areas. Instead the applicant must assess the functions and values of the wetlands to be inundated, and compensate for these particular functions and values.

Potential wetland mitigation ideas are described in the DEIS on pages 2-34, 4-30, 4-69, 4-72, and in Appendix C, but this information is generalized, does not allow for evaluation of replacement of lost wetland function and value, includes no specific commitments for implementation, and is inadequate to determine compliance with the 404(b)(1) Guidelines.

As discussed at the August 15, 1995 interagency meeting in Billings we suggest that impacts to jurisdictional wetlands may be determined most expeditiously by cross-referencing between the existing Montana Riparian Wetland Association (MRWA) riparian-wetland vegetation mapping already done (identifying 541 acres of riparian-wetland acres below elevation 3,429 feet) and Federal wetland delineation criteria.

We recommend contacting the MRWA to see if MRWA staff would be available to carry out this cross-referencing to determine impacts to jurisdictional wetlands. It would appear expeditious for MRWA to carry out this work since they have understanding of both Federal wetland delineation criteria and existing riparian-wetland vegetation mapping and are familiar with the Tongue River wetlands. A wetland mitigation plan would then have to be prepared to provide adequate mitigation for the loss of functions and values of impacted wetlands.

An acceptable wetland mitigation plan that provides for adequate replacement of wetland functions and values lost as a result of implementation of the Tongue River Basin Project should include consideration of both direct, indirect, and cumulative effects. It should contain a statement of goals, a monitoring plan, long-term management/protection objectives and a commitment to conduct additional work, if required, to meet the goals of the plan.

115 *Following publication of the draft EIS, the project sponsors contracted for the preparation of a Clean Water Act (33 U.S.C. 1344) Section 404(b)(1) Guideline Evaluation of the impacts to jurisdictional wetlands that would be affected by higher reservoir levels associated with the proposed project. This effort followed project sponsor efforts to identify more specifically (1) the number of acres of jurisdictional wetlands that would be affected, (2) the functions and values of those wetlands, and (3) a preliminary site-specific plan to mitigate for those lost functions and values. These undertakings essentially demonstrated that in the long term, and in light of natural reestablishment and the project sponsors' proposed mitigations, wetland impacts from the Tongue River Basin Project will be negligible. In the short-term, however, impacts to wetlands will be moderate to major. The wetlands impact statement in* ***Table 2-7 of the final EIS*** *has been changed to reflect this conclusion.*

115a *As indicated in the response to Comment number 115, the project sponsors contracted for the preparation of a Clean Water Act (33 U.S.C. 1344) Section 404(b)(1) Guideline Evaluation of the impacts to jurisdictional wetlands that would be affected by the proposed Tongue River Basin Project. The 404(b)(1) Guideline Evaluation, which is included as* ***Appendix I of the EIS****, served as the basis for the project sponsors' preliminary site-specific plan to mitigate for lost wetland functions and values related to the project.*

Comment Number

EPA believes that criteria to measure the success of wetlands mitigation efforts should be developed. There should also be a clear commitment to take corrective actions if the pre-established criteria for success are not being met. These corrective actions will more than likely involve revegetation and/or additional efforts at successfully establishing wetland hydrology, and/or potentially carrying out wetland mitigation work at other sites. These corrective actions should be mandated by conditions placed in the 404 permit.

Also, wetland mitigation should occur at least concurrently with project impacts, and if possible, in advance of project impacts. This is needed to reduce temporal losses of wetlands functions, and to reduce the uncertainty over whether mitigation will be successful in offsetting wetland losses.

116 15. We are also concerned about the statement in the DEIS (page 4-37) indicating that the elevation zone amenable to colonization by riparian vegetation (3,429 feet to 3,431 feet) would be considerably smaller than the zone now vegetated by riparian communities (3,417 feet to 3,425 feet). Not only would the elevational zone be reduced, but the surface area of reservoir margin suitable for establishment of riparian vegetation would be disproportionately reduced, and growth of woody vegetation on the reservoir margin might be inhibited by ice formation during winter and ice scour during spring breakup. The wetland mitigation plan should include consideration and compensation for this reduction in reservoir margin suitable for colonization by riparian vegetation.

117 16. Also, we recommend that materials excavation sites be evaluated to determine if opportunities to create wetlands in association with excavations may be available. We caution that failures in wetland mitigation efforts have occurred where excavations were expected to create wetlands, but did not because ground water levels were not monitored carefully enough beforehand and predicted wetland hydrology did not develop. Monitoring of ground water levels at a mitigation site is needed to assure that ground water levels are compatible with excavated elevations to assure that wetlands will be created. We advise long term ground water monitoring since ground water levels can vary significantly year to year. We suggest that wetlands created through excavations should have variable excavated elevations in order to have wetland habitat at varying ground water levels.

118 17. We believe that areas along the reservoir shoreline that are stated to have "severe erosion hazards" (page 4-6) should be identified in the FEIS and commitments to stabilize such areas should be provided. We have concerns about allowing the shorelines to "stabilize over the long term". This appears to be a euphemism for allowing severely eroding shorelines to erode until all erosive soils have eroded into the reservoir.

13

[116] *On behalf of the project sponsors, the Montana Riparian and Wetlands Association delineated (**see response to Comment number 95**) jurisdictional wetlands and riparian vegetation around Tongue River Reservoir that would be affected as a result of the proposed project. This delineation included consideration of the number of acres of affected jurisdictional wetlands that would reestablish naturally with proposed reservoir operations/ elevations. The project sponsors' preliminary wetlands mitigation plan was founded upon the MRWA's assessment of affected jurisdictional wetlands. The plan includes consideration and compensation for the reduction in reservoir margin suitable for colonization by both riparian and wetland vegetation.*

[117] *Any excavations where groundwater levels can be assured will be investigated as to the potential to create wetlands.*

[118] *Since publication of the draft EIS, the project sponsors have more adequately investigated project-related impacts to shoreline erosion. **See Section 4.6.1.1** and **Figure 4.1** for information regarding erosion hazards related to the proposed project.*

Following construction, riparian vegetation probably will grow in some areas along the fringe of the new reservoir pool. If reservoir levels are near full-pool when there is ice cover, vegetation might become frozen in the ice and could be plucked out of the ground by the ice if the reservoir rises slightly higher, especially during break-up. This is unlikely because winter reservoir levels typically would be held below full pool and ice formation likely will occur below the elevation at which riparian vegetation will reestablish. Erosion by wind-blown ice piled up along the shoreline is another potential problem.

*Following construction, shoreline erosion and vegetation damage during spring break-up could be monitored. If such damage is occurring, the reservoir operation committee (**see response to Comment number 10**) could choose to hold reservoir levels slightly below full pool during the winter and spring break-up. This would keep riparian vegetation near the shoreline from becoming frozen in the ice, and keep wind-blown ice from piling up near the full-pool shoreline. The reservoir could then be raised to full pool following ice break-up.*

Comment Number

shoreline/bank erosion concerns are increased by the DEIS's predictions of potential dramatic fluctuations in reservoir levels (page 4-68).

It is also stated (page 4-37) that the new reservoir shoreline would be steeper than the existing reservoir shoreline, and that ice formation during winter and ice scour during spring breakup would cause ice to shift and shear off or uproot woody plants frozen in the ice. We are concerned that these erosional impacts of the new reservoir level and of new reservoir operations may have significant adverse impacts (e.g., aggravating shoreline erosion and reservoir sedimentation, increased destruction of shoreline vegetation and habitat, reduced shoreline habitat, etc.). These concerns should be addressed in the FEIS (i.e., assess extent of shoreline erosion, describe needed erosion control measures, assess extent of impacts on shoreline vegetation and habitat, describe mitigation for these impacts). Efforts to address shoreline stabilization, should be carried out to prevent or minimize erosion in areas with severe erosion hazards.

119 18. For aquatics and fisheries mitigation it is stated (page 2-33) that the 25 cfs minimum flow released during construction of the low level outlet works would be increased to 75 cfs if icing and/or high temperatures stressed aquatic biota. We are pleased to see that stress on aquatic biota will be monitored during construction. We are concerned, however, that little information on such monitoring is disclosed in the DEIS. How will stress on aquatic biota be monitored during construction? What criteria will be used to identify stress on aquatic biota? How will aquatic biota stress monitoring results be fed back to construction managers to implement measures to increase river flows if needed?

We believe the monitoring program and feedback loop proposed to evaluate stress on aquatic biota during construction, which would provide the basis and mechanism for increasing river flows during construction, if necessary, be described in the FEIS. We are pleased to see that the project sponsors in conjunction with the USFWS will provide additional monitoring and feedback loop information in the FEIS.

120 19. We had preliminarily asked if the proposed increase in reservoir depth would measurably increase the slight dissolved oxygen deficit that is said to exist near the reservoir bottom during part of the summer (page 3-13) or affect thermal stratification in the reservoir. We were pleased to see that the project sponsors will prepare a dissolved oxygen profile of the reservoir and consider monitoring of the reservoir for up to two years following refilling to determine if dissolved oxygen deficits or thermal stratification is occurring, and mitigate appropriately. These commitments should be identified in the

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119 *Since publication of the draft EIS, the project sponsors have eliminated consideration of a temporary bypass structure to pass flows during rehabilitation of the low-level outlet works (**see response to Comment number 233**). Consequently, the one-time low flow of no less than 25 cfs for a period not to exceed two weeks is no longer necessary. Flows during this component of project rehabilitation will be no less than 75 cfs, which should cause little stress to the aquatic ecosystem. Still, the project sponsors commit to the following monitoring plan: A thermograph would be installed to measure water temperature at the USGS gaging station about 3,500 feet downstream from the dam. The thermograph would be monitored during construction, and if it appeared that either icing or high water temperatures (60 degrees Fahrenheit or greater) would be a problem, then release rates would be increased. DFWP fisheries biologists would be consulted regularly during this effort.*

120 *During the summer, dissolved oxygen concentrations are depressed in the deepest 3 to 4 feet of the reservoir. Mixing and reoxygenation occur as water is released from the dam so that dissolved oxygen levels are suitable for aquatic species in the river downstream. Increasing the depth of the reservoir might slightly increase the deep zone within the reservoir where dissolved oxygen is depressed. DNRC will monitor dissolved oxygen concentration in the Tongue River below the reservoir to determine whether deoxygenated water is being released from the bottom of the reservoir. Monitoring would take place during winter and summer when a dissolved oxygen deficit would be most likely. Monitoring data could be recorded and retrieved monthly. If dissolved oxygen concentrations were depressed enough to endanger organisms in the river, the project sponsors could consider making supplemental releases through the auxiliary outlet. The auxiliary outlet, if installed at a shallower depth (higher elevation) than the existing outlet, would withdraw water from nearer the reservoir surface where dissolved oxygen is more concentrated.*

Comment Number

FEIS.

121 20. The loss of the springtime peak flows in the Tongue River following construction with full Tribal and Wyoming water development is likely to have significant effects upon the river bed and channel and aquatic ecosystem. Figure 4-8 on page 4-19 shows historic springtime peak flows of approximately 1,250 cfs below the dam are expected to decrease to 600 cfs. Figure 4-10 on page 4-21 shows at Miles City historic springtime peak flows of 1,250 cfs would decrease to 450 cfs, with full Tribal and Wyoming water development). The geomorphological and ecological effects of such reductions in peak spring flows have not been adequately disclosed in the DEIS. We were pleased to see that the project sponsors will address the geomorphological and ecological effect of reductions in springtime peak flows in the Tongue River.

121a 21. We were very concerned about adverse impacts to aquatic biota that would result from the one time low river flow of 25 cfs that would be anticipated during a two week late fall and early winter period in 1997-98 during proposed construction of the low level outlet works (pages 2-33, 2-49). We are pleased to see that the auxiliary low level outlet works will clearly be included with the preferred alternative in the FEIS.

The auxiliary low level outlet works would provide many benefits including the following:

- avoid the need for the installation of a temporary stream bypass in the existing outlet, resulting in less complicated and costly rehabilitation of the existing low level outlet works.

- would avoid the cost of the temporary stream bypass.

-would avoid impacts to downstream fishery resources due to reduced flows.

-would allow streamflows to be released during periods when the main outlet was being inspected or repaired, and would avoid any impact to downstream fishery and aquatic resources during those periods in the future.

Given the fisheries protection benefits and future operational flexibility provided by the auxiliary low level outlet works, the EPA strongly supports inclusion of the auxiliary low level outlet works in the preferred alternative.

121b 22. Table 2-6, page 2-54, shows that the auxiliary outlet works will add $1 million to the cost of the project. The benefits of the auxiliary low level outlet works noted in the above comment (page 2-48) include avoiding the need for the installation of a

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121 *The flows presented in **Figure 4-9 and 4-11** are average monthly flows, not peak flows. The dramatic reductions in average monthly spring flows you refer to are those that would occur with full Wyoming and full Tribal development. Typical June average monthly flows at Miles City would be similar under the full Tribal and no Wyoming scenario to those that occur under existing conditions (**see Figure 4-11**).*

*Peak flows under the various alternatives are compared to those that occur under existing conditions in **Section 4.7.1.9 of the EIS**. Peak flows in the Tongue River usually occur during the spring. Peak flows that are expected to be reached on an average of every 5, 10, 25, 50, 100, and 500 years in the river below the dam are moderately higher under the labyrinth weir alternative than at present and slightly higher under the RCC alternative—although still substantially lower than the pre-dam peaks.*

*Dominant discharge flows (bankfull flows) are important in forming and maintaining the stream channel and associated riparian willow and cottonwood vegetation. The effects of the various alternatives on dominant discharge flows are described in **Appendix E of the EIS**. Under the labyrinth weir alternative, the frequency of dominant discharge flows would increase from about once every 100 years, under existing conditions, to about once every 25 years. Under the RCC alternative, dominant discharge flows would occur with about the same frequency as under existing conditions. Prior to the dam, the dominant discharge flow probably occurred about once every 10 years on average.*

*In summary, flood and springtime peak flows would be similar under the RCC alternative to those that occur under existing conditions, and would generally increase under the labyrinth weir alternative. Additional water development by Wyoming has the potential to reduce inflows to the reservoir and peak spring flows downstream. Reasonably foreseeable water developments by Wyoming are discussed in **Sections 2.5.3 and 2.5.4 of the EIS**.*

The Tongue River Reservoir traps sediments which otherwise would be transported down the river. As a result, the water flowing out of the dam is relatively clear, and the clear water has eroded much of the fine sediment from the stream channel below the dam. This process leaves behind coarser gravel and cobble which "armor" the streambed from further erosion. Bovee (1975) reported that the Tongue River channel is armored from the dam to

temporary stream bypass in the existing outlet result in <u>less</u> complicated and <u>costly</u> rehabilitation of the existing low level outlet works, and would <u>avoid the cost</u> of the temporary stream bypass. The FEIS should clearly display the costs and cost savings including operational costs of the preferred alternative with the auxiliary outlet works.

122 23. There was very little discussion in the DEIS regarding potential project trade-offs associated with water conservation and improved irrigation water management by the TRWUA and Tribe to reduce irrigation water use vs. reservoir storage capacity. Are there any practical opportunities to reduce the size and scope of the project in association with improved water conservation and irrigation water management? What is being done to monitor and measure irrigation water use and management, and to assure that efficient irrigation water management methods are being used?

16

Birney, and is armored in spots from Birney to the Brandenburg bridge. Fine sediment entering the Tongue River from tributaries prevent armoring farther downstream. An armored stream channel has less fresh alluvium available for deposition on channel islands and bars, and for subsequent colonization by young willows and cottonwoods.

There is concern that by reducing peak flows and trapping sediments, the Tongue River Dam has affected riparian plant communities downstream. No studies have been conducted to evaluate these types of effects in the Tongue River valley. Studies on the effects of the operations of Yellowtail Dam indicate that vegetated islands and river bars in the Bighorn River downstream have decreased in size (DNRC 1977). The amount of riparian vegetation in the Bighorn River floodplain, however, has remained unchanged, although the condition of the plant communities was not evaluated. Repair and enlargement of the Tongue River Dam would not substantially affect the sediment trapping efficiency of the reservoir, or peak flows downstream.

121a *Comment noted.* ***See responses to Comment numbers 119 and 233.***

121b *The $1 million cost for an auxiliary outlet included in the draft EIS was an estimate based on a true low-level placement (at an elevation similar to that of the existing outlet). During preparation of the draft EIS, support for an auxiliary outlet was so strong that it has been raised to the status of a proposal rather than an option. In order to make it more affordable, it may need to be at a significantly higher elevation. Costs for this type of outlet configuration may be less. Since the bypass is no longer being considered (****see responses to Comment numbers 119 and 233****), a cost comparison is unwarranted.*

122 ***See sections 2.3.1.8 and 2.3.10.11 of the final EIS*** *for information regarding the potential for water conservation as part of the Tongue River Basin Project.*

Comment Number

SUMMARY OF RATING DEFINITIONS

ENVIRONMENTAL IMPACT OF THE ACTION

LO--LACK OF OBJECTIONS

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC--ENVIRONMENTAL CONCERNS

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO--ENVIRONMENTAL OBJECTIONS

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU--ENVIRONMENTALLY UNSATISFACTORY

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

ADEQUACY OF THE IMPACT STATEMENT

CATEGORY 1--ADEQUATE

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

CATEGORY 2--INSUFFICIENT INFORMATION

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analysed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

CATEGORY 3--INADEQUATE

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From: EPA Manual 1640, "Policy and Procedures for the Review of Federal Impacting the Environment."

Comment Number

TONGUE RIVER WATER USERS ASSOCIATION
Box 6, Decker, MT 59025

RECEIVED
AUG 25 1995
DNRC

August 22, 1995

Mr. Edward M. Pettit, Environmental Coordinator
Montana Department of Natural Resources and Conservation
P.O. Box 202301
Helena, MT 59620-2301

RE: TONGUE RIVER BASIN PROJECT
Draft Environmental Impact Statement, June 1995

123 The Board of Directors of the Tongue River Water Users Association submit the following additional comments to the TONGUE RIVER BASIN PROJECT, Draft EIS, June 1995.

The Directors of the Tongue River Water Users Association have reviewed the Roller-Compacted Concrete Alternative design and we are unanimous in our rejection of this RCC Alternative.

The Directors of the Tongue River Water Users Association had reached a verbal agreement with the State of Montana whereby the Association would pay five million dollars towards the construction of a new spillway on the Tongue River Reservoir. The Labyrinth Weir design, presented at that time, was the design which the Association approved and for which the Association agreed to pay that sum.

The Labyrinth Weir Spillway Alternative would not disturb the condition of the present original dam --its stability being a primary concern. Also, the present earthen structure is relatively maintenance free and the Labyrinth Weir spillway would require minimal maintenance, whereas the new protective covering of dirt over the RCC Alternative will be subject to wind and rain erosion and require constant maintenance.

Lack of support for the RCC Alternative is prevalent among the members of the Tongue River Water Users Association and the Tongue & Yellowstone River Irrigation District and we are unwilling to commit five million dollars for this design.

We still wish to see the Tongue River Basin Project completed and we are willing to work with the project sponsors to find an acceptable solution.

Submitted by the Tongue River Water Users Association.

Art Hayes Jr.

Art Hayes Jr., President

123 *In response to the concerns of the Tongue River Water Users Association (TRWUA), DNRC provided background materials and held a meeting with TRWUA to discuss the reasons why the RCC alternative again surfaced as a viable alternative. The meeting, which was held on September 21, 1995, presented the results of two separate analyses which demonstrated the technical feasibility and cost-effectiveness of the alternative. The background materials, which were sent in advance of the meeting, showed the same results. As a result of the September 21 meeting, the TRWUA now agrees that the RCC alternative warrants further consideration during project-related environmental compliance activities.*

Comment Number

RECEIVED
AUG 2 5 1995
DNRC

August 24, 1995

Mr. Edward Pettit
P.O. Box 202301
Helena, Montana 59620

Dear Sir:

124 I have been working with some of the landowners in the Tongue River Basin, on their weed problems. It was during this time period that we were discussing the Tongue River Dam Project. By mutual agreement, we thought it importantthat they voice their opinion, which will be to help locate, identify and control noxious weeds in the area. Their very livelihood at stake if the problem were not addessed. This is only a portion of the landowners in the drainage, but with the schedule we had to work with, it gives you some idea of their concerns. Which I feel are representitive of the area residents.

Sincerely Yours,

Jerome Barnick

Big Horn County Weed District
Jerome Barnick, Supervisor

124 *The project sponsors will control weeds on lands disturbed by project construction as noted in* ***response to Comment number 79****. Landowners in the basin are invited to participate in the development of project-related weed control plans.*

Comment Number

August 21, 1995

Mr. Edward Petti,
Montana Department of Natural Resources and Conservation
1520 East 6th Ave
P.O.Box 202301
Helena Mt. 59620-2301

AE: Tongue River Basin Project Environmental Impact Statement
Weed District Comments

Dear Sirs:

125 We, the undersigned residents of Big Horn County, being land owners and operators in the Tongue River Basin drainage, would like to voice our support for the weed districts. Their efforts to control noxious weeds is a never ending battle. We as land owners are also commited to the erradication and/or suppression of noxious weed infestations in the Tongue River drainage. With the increased traffic, soil disturbance and public concern, associated with the project, we feel that the parties involved with implementing these changes should be responsible, financially, to help offset the increased expenses incurred by the districts and landowners.

Sincerely yours,

Mary Jo Reanis Phone 757-2431
HC 40 Box 105
Decker, Mont. 59025

Jerry Lyle
Box 34
Decker MT 59025
757-2237

Sean Dilbert
DW Ranch
HC 40 Box 108 406 757-2539
Decker Mt. 59025

Dave Klevig
HC-42 Box 630
Busby, MT. 59016
757-2232

Era & Harvey Foster
HC 40 Box 103
Decker Mt. 59025 406-757-2293

[125] *The Tongue River Basin Project sponsors also support the county weed districts in their efforts to control noxious weeds in the Tongue River Drainage. All project-related activities will include funding to support efforts to eradicate or suppress noxious weed infestations on project land. By undertaking such actions, the project sponsors feel we are doing our part to help control noxious weeds in the drainage. Also, please* ***see responses to Comment numbers 69-84****. Traffic and soil disturbance are short-term impacts associated with project-related construction. Funding for long-term weed control measures may be included in project-related enhancement and mitigation activities.*

Comment Number

RECEIVED
AUG 2 5 1995
DNRC

TONGUE AND YELLOWSTONE RIVER IRRIGATION DISTRICT
MILES CITY, CUSTER COUNTY, MONTANA

Edward M. Pettit
Environmental Coordinator
Montana Department of Natural Resources and Conservation
P. O. Box 202301
Helena, Montana 59620-2301

RE: TONGUE RIVER BASIN PROJECT
Draft Environmental Impact Statement, June, 1995

The undersigned Tongue & Yellowstone River Irrigation District, Miles City, Custer County, Montana, does hereby submit for your review and consideration, the following comments concerning the Draft Environmental Impact Statement of June, 1995.

126 The Tongue & Yellowstone River Irrigation District is the owner and holder of the second oldest water right decreed by the Courts of Montana in 1914 having been filed on August 9, 1886, for 7500 miners inches. The district annually and continuously delivers water to its membership of _____ annually since the formation of the District from the Tongue River through its system located in Custer County, Montana. The District therefore, has a vital interest in the project.

127 The District wishes first to commend the Sponsors and their employees on the very thorough and informational proposed statement. Considerable time, money and effort has already been expended and these comments are not to be considered, nor are they being submitted in any manner critical of the proposed impact statement and it is in this light the following comments, suggestions and statements are respectfully submitted for consideration and review by the Sponsors and the many other interested parties.

128 Secretary of the Tongue and Yellowstone River Irrigation District, Roger Muggli, and other members of the District have recently made a trip to the dam site, having with them, the proposed Draft Statement with all of its exhibits and statistics. The Tongue and Yellowstone River Irrigation District would like to go on record as being in support of the Labyrinth Weir Alternative. This recommendation is made even though it appears from the present information that it will be the most costly in its

126 *Comment noted.*

127 *Comment noted.*

128 *Comment noted.*

Comment Number

original design and construction. It would appear in the judgment of the Tongue and Yellowstone River Irrigation District that:

129 (1) the ultimate savings with the Labyrinth Weir Alternative over the future years would by far offset the original cost savings proposed in the RRC Alternative 1.

130 (2) that the original dam, which from the information furnished in the EIS is sound and in good condition and it would not be disturbed or damaged by the addition of the Labyrinth Weir Alternative. The stability of the old dam would therefore be maintained which is very important to the safety and use of the entire system.

131 (3) The RCC Alternative 2 appears to cause more serious problems not only in the construction stages but also the future integrity of the dam itself. The removal of the top portion of the dam being approximately 13 feet, together with the total removal of the "Toe berms" causing the removal of thousands of tons of weight which presently is contributing to the stability of the dam, not only in weight, but blocking force against the back of the dam, coupled with the added increase of the additional 20 thousand acre feet of water being stored which increase the risk factor to the dam itself far beyond the cost savings in using this Alternative 2.

132 (4) The Weir method appears to be engineeringly safer and more practical.

133 (5) The installation of the Weir method would also eliminate the use of three release systems and have only one system which would cause less erosion at the outlet back into the Tongue River.

134 (6) The Weir method would be easier to maintain and under the present system, lessen the cost to the parties responsible for the maintenance, that is the Tongue and Yellowstone River Irrigation District and the Tongue River Water Users Association and also the Sponsors.

135 (7) In the event that the Alternative No. 2 was instigated, it would appear to the District that extensive and expensive core drilling of the present dam would have to be made to determine what the present condition is and what would be the effect of removing the berm weight on the entire structure. Also the blocking effect of the toe area which may have more value to the dam in blocking effect than just its weight alone.

129 *The comment makes the assumption that the labyrinth weir alternative would require less maintenance than RCC. However, RCC construction is intended to be practically maintenance free. It is over-designed in thickness (4 feet is typical) so that it can deteriorate substantially without effecting its structural condition. RCC was first introduced for dam construction in 1980, and has rapidly caught on as a construction material because it can be placed and maintained much more like an earthen embankment than a concrete structure. The existing spillway is far from being maintenance free. The concrete surface area of the labyrinth weir would likely be at least double that of the existing spillway, greatly increasing maintenance requirements. Actual operation and maintenance costs will be estimated during final design.*

130 *Any rehabilitation alternative that is selected and constructed will not adversely affect the stability of the existing dam embankment.*

131 *The construction challenges for the RCC alternative are not greater than those of the labyrinth weir alternative. In the labyrinth weir alternative, the spillway channel would need to be blocked off for at least one and possibly two construction seasons. With the RCC alternative, the RCC portion of the spillway can be constructed before the principal spillway is blocked for construction.*

The existing dam embankment is a massive structure that is very stable. The removal of the top portion of the dam and the toe berms and subsequent placement of RCC on the embankment does not reduce the safety factor for the structure.

132 *Once constructed, any alternative selected will provide the degree of safety that is necessary to provide future safe operation of the project.*

The labyrinth weir would pose a greater risk of flooding during construction because there would not be an auxiliary spillway in place during major construction as there is with the RCC alternative.

Comment
Number

133 *The RCC alternative proposed in the EIS consists of three spillway components. A primary structural concrete spillway, a secondary RCC spillway, and an emergency RCC spillway. In final design, the need for the secondary spillway will be studied and it might be dropped from the alternative. The RCC spillway would operate only during an extreme storm event, of the magnitude to be expected on an average of at least 100-years. These extreme storms may cause erosion downstream of the dam, but whether the erosion would be greater from the RCC alternative than from the labyrinth weir alternative is purely speculative. The existing spillway tail-race channel has obviously eroded badly in the past and may continue to do so in the future. The RCC channel could be armored to prevent erosion from all but the highest flows.*

134 ***See response to Comment number 129**.*

135 *Extensive core drilling already has taken place, and only about 6 drill holes are planned in the dam itself to investigate its suitability for the RCC alternative. Over 50 shallow auger holes, however, are planned downstream of the dam for this alternative, at a total cost of $15,000 to $20,000. Similar expense would be needed for the labyrinth weir alternative to investigate the foundation there. This cost is not a significant amount compared to the project construction cost. Also, **see response to Comment number 131**.*

Comment Number

136 The District also feels that the Sponsors or the powers that be who would be required to enforce the monitoring of the waters should have mandatory power to act rather than as suggested in the statement Mitigation Plan October 21, 1994, which says the water would be "tracked" perhaps by a water commissioner, the District recommends that a Water Commission be appointed with full power and authority to act including a fine or penalty payment by those who improperly take water in advance of the decreed priority users. This must be in place so that the down river users can be protected. Then after the construction is complete, this Commission would be retired and the operation of the dam will be reverted back as it presently is, and no permanent water commissioner would be appointed after construction is completed.

137 The report comments on the five member operation of the dam board to oversee after construction. The District recommends that one of its members be a mandatory member of the board as it is the largest decree right and along with the Tongue River Water User's Association the obligation to deliver the water to the users. To allow an election of the fifth member, could leave them without input or representation on this very important board. A member of the Tongue and Yellowstone River Irrigation District would contribute substantially to the membership and could provide valuable information to help mitigate any potential liability of the Sponsors to down stream users.

138 On Page 2-39 the Enhancement Team does not have an Agricultural or Irrigator representative on it and it would appear important that a member of that industry which is effected should be considered.

139 On Page 3-8 the question is raised as to who has control of the operation during the construction. The authority should be clearly spelled out during this period.

140 The question is also of concern as to what consideration or effect does this have on the Yellowstone River Compact the right therein established.

141 Another issue which should be addressed is that the Tongue and Yellowstone River Irrigation District has been paying the Tongue River Water Users Association since 1939 for 6000 acre feet of stored water annually. Is this the same status as the other water contract users even though many of them may be paid up and are no longer paying Tongue River Water Users Association. Is this claim on the stored waters of the reservoir still in effect and to be honored?

136 *Currently, there is no formal plan in place to "track" water downstream during construction. The use of a water commissioner is merely one possibility of doing so if the need to track water arises. If monitoring downstream flows is necessary during construction, the project sponsors will consider various ways of doing so. Because the issue has direct relevance to irrigators in the basin, the Tongue River Water Users Association will have an opportunity to take part in proposing and evaluating solutions. Also* ***see response to Comment number 148****.*

137 *The composition of the postconstruction reservoir operations committee is discussed in the* ***response to Comment number 10****. This composition is consistent with the provisions of both the Northern Cheyenne - Montana Water Rights Compact and The Northern Cheyenne Indian Reserved Water Rights Settlement Act (PL. 102-374, 106 Stat. 1186). The decision as to whether a member of the Tongue and Yellowstone River Irrigation District will serve as the fifth committee member is entirely up to the other four committee members.*

138 *The enhancement planning team to date has been representative of the project sponsors. As site-specific enhancement projects are being planned and proposed, input from all interested parties will be sought. Such public involvement will be part of public scoping under NEPA for site-specific environmental compliance activities required by the Settlement Act.*

139 *Tongue River Reservoir operations during project-related rehabilitation activities will be controlled by DNRC. During this period, the primary operational concern will be safety, both for construction crews on site and for downstream floodplain occupants. Components of the construction-related interim operations plan are described in* ***Section 4.7.1.1 of the EIS****.*

Comment Number

140 *The Yellowstone Compact was finalized in 1950 and includes stipulations that divide the waters of the Tongue River between Montana and Wyoming. The Yellowstone Compact specifies that all water rights existing in both states prior to January 1, 1950 are to be protected and administered under the prior appropriation doctrine. The remaining water is to be split 60 percent to Montana, and 40 percent to Wyoming. The 60/40 split is for all Tongue River flows, and is to be measured at Miles City.*

The Yellowstone Compact does not address Indian reserved water rights. Montana believes that the Northern Cheyenne Tribe's reserved water rights should be considered pre-1950 rights, and the Northern Cheyenne Water Rights Compact was negotiated under this assumption. Considering the Tribe's water rights as being pre-1950 reduces the amount of water that can be split 60/40 between Montana and Wyoming.

Please see the ***response to Comment number 106*** *for a discussion of the Yellowstone Compact.*

141 *There are different kinds of existing water purchase contracts on the Tongue River Project. Most water purchase contracts require annual payments toward a contract balance plus operation and maintenance (O&M) costs. When the principal is paid in full, the contracts require payment of only O&M costs. Annual purchase contracts, such as T&Y and Decker contracts, require payment of an annual fee plus O&M, and their contracts stay in effect as long as water is being used. They do not become paid in full. The annual fee is equal to or greater than that for long-term contracts. The right to the use of stored water under either type of contract is the same. When the Tongue River Dam rehabilitation project is completed and is operated to meet the obligations of the Compact, existing contracts will remain in effect and their right to use water will continue to be honored, as long as payments are kept current.*

Comment Number

142 In addition to the stored water cost above, the District will continue and still pay their share of the operation and maintenance costs.

143 With reference to the Development of Alternatives shown on Page S-3, the District is concerned and believes that in the synopsis of the issues the following should be added: "The effects of the Tongue River Basin Project both short term and long term on the Tongue River Water Users Association and Tongue and Yellowstone River Irrigation District should be considered in the development and maintenance aspect of this project.

144 Reference is made to the note on Page 2-12, Chapter 2, pertaining to Coffer Dam storage and the District feels that during the construction stage there should be a minimum of 30,000 acre feet in storage and not a lesser amount. The District could have serious irrigation water supply problems if, during the construction stage an arbitrary decision was made to reduce the 30,000 acre feet.

145 Reference is made to Page 4-10 Chapter 4, the question arises whether or note the District would request in the fall of 1997 additional water from the stored supply, in the event that it was necessary for this supplemental release to satisfy the requirements of the Districts users.

146 Further reference is made to Chapter 4, Page 4-29. In the event that Alternative No. 2 is adopted and the District wishes to restate that it is in opposition to Alternative No. 2 that the requirement of a minimum of 30,000 acre feet to be returned during construction must be followed to meet the down stream water users requirements.

The District offers to meet with the Sponsors or other representatives at any time to discuss and review the matters presented in these comments concerning the Draft Environmental Impact Statement, June, 1995, and recommends that the above comments be considered in the final determination and project construction.

Respectfully submitted by Tongue and Yellowstone River Irrigation District.

By: Paul Herzog
Paul Herzog - Chairman

Attest: Roger Muggli
Roger Muggli - Secretary

142 *Comment noted.*

143 *The impacts to irrigators from the proposed Tongue River Basin Project are included in the analyses of each alternative.*

144 *The amount of water to be stored behind a coffer dam during construction will not be determined until final design, and will depend on which alternative is selected. Under the labyrinth weir alternative, a coffer dam would be used to block off the spillway so it could be demolished and replaced. There would be no available spillway during construction and a large runoff event could overtop the coffer dam and cause it to fail. Storing water behind a coffer dam is risky, and any decisions to do so will be well founded.*

Preliminary analyses by DNRC indicate that it may be possible to store 30,000 af behind a coffer dam under the labyrinth weir alternative with minimal risk. This could be done by waiting to store the bulk of the water until late in the runoff season, after the flow peak has passed. However, this analysis will be revisited by the final design contractor before any decision is made if the labyrinth weir alternative is selected.

If the RCC alternative is chosen, it is likely that more stored water will be available during construction. This is because it may be possible to sequence construction so that some type of functional spillway is always in place. Preliminary analysis indicates that it may be possible to store up to 45,000 af of water during construction under the RCC alternative.

145 *Water deliveries are in accordance with the Compact. Direct flow rights will be honored in order of priority. Storage rights will be fulfilled as water is available, and will be pro-rated during water shortages. State contract rights will remain the same after the project as they were before. If the commenter is referring to the proposed one-time low flow event of no less than 25 cfs for a period not to exceed 2 weeks, that flow is no longer a component of the project (**see responses to Comment numbers 119 and 233**). Therefore, the project sponsors anticipate adequate streamflows for downstream water user needs during this period.*

146 *Regardless of which construction alternative might be selected, rehabilitation of the low-level outlet works will require a reservoir drawdown to approximately 9,000 af. Following this initial drawdown, the project sponsors will take measures to increase reservoir contents as rapidly as possible (either to 30,000 af under Alternative 1 or 45,000 af under Alternative 2).*

Comment Number

RECEIVED
AUG 25 1995
DNRC

AUG 22, 1995

DEAR SIRS,

I AM AN IRRIGATOR OUT OF THE T&Y DITCH AND AFTER READING THE DRAFT EIS, HAVE A FEW POINTS I WOULD LIKE TO HAVE ADDRESSED OR EXPLAINED IN MORE DETAIL.

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147 2.2 IF IT IS NOT COST EFFECTIVE TO INSTALL HYDROPOWER IN THE DAM AT THIS TIME, MIGHT IT BE PRUDENT TO MAKE PROVISIONS TO TAP INTO THE SYSTEM EASILY, SO IF IN THE FUTURE ENERGY RATES RISE (AS THEY SEEM TO DO) IT COULD HELP OFFSET THE COST OF OPERATION & MAINTENENCE OF THE DAM?

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148 2.3.9.2 (2) IT WOULD SEEM THAT A "TEMPORARY WATER COMM." WOULD BE NEEDED IN A LOW FLOW YEAR. THIS PERSON SHOULD BE IN PLACE AT THE BEGINNING OF THE PROJECT. WHO WOULD BE THE AGENCY? WHO WOULD PAY FOR THIS? WHAT AUTHORITY WOULD HE HAVE? HOW WOULD WATER USE ALONG THE RIVER BE MONITORED? WHAT PENALITY WOULD BE IMPOSED FOR INFRACTIONS?

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149 (4) TO "POTENTIALLY COMPENSATE" WATER ~~USERS~~ CONTRACT HOLDERS AT EFFECTIVE "AVERAGE CONTRACT WATER PRICE" FOR DOCUMENTED

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[147] *Making provisions for hydropower in the future already has been analyzed and discussed (**see Section 2.2 of the EIS**). At this time it does not appear likely that the outlet will need major rehabilitation and therefore it is not prudent to plan on major modifications of the outlet to allow for future hydropower possibilities. If major rehabilitation, such as lining the outlet tunnel, is required, the project sponsors will look at the cost of providing the opportunity for hydropower modifications later; however, this is not one of the project goals.*

[148] *For a water commissioner to be employed to "track" water downstream during rehabilitation of Tongue River Dam, the decreed water right holders would have to petition the district court to implement such a measure. Such a petition would require at least 15 percent of the decreed water right holders. If the district court assigned a commissioner, that person would be an employee of the court, and the costs of the commissioner's services would be paid by the parties that benefit from those services. In other words, the decreed water right holders would pay for the commissioner. If a commissioner is assigned by the district court, that person "shall have authority to enter upon any ditch, canal, aqueduct, or other source for conveying the waters affected by the decree and visit, inspect, and adjust all headgates or other means of distributing the waters and shall have the same powers as the sheriff or constable to arrest any and all persons interfering with the distribution made by him, to be dealt with according to law" (MCA 85-5-108).*

[149] ***See response to Comment number 46**.*

Comment Number

PAGE 2

LOSSES WOULD SEEM TO BE OF LITTLE HELP. IT SEEMS THAT THEY SHOULD BE GARANTEED COMPENSATION FOR A % OF PRODUCTION LOSS AT CURRENT MARKET RATE.

150 2.3.9.4 (6) A RELEASE OF 190 CFS. MAINTAINED DURING CONSTRUCTION WOULD JUST MEET THE NEEDS OF THE T & Y DITCH AND THE SENIOR WATER RIGHT HOLDER. IF THIS HAPPENS, NOBODY UP RIVER FROM THE T & Y WOULD BE ABLE TO PUMP OR DIVERT WATER. THIS WOULD BE HARD FOR MOST FARMERS & RANCHERS TO LIVE WITH.

150 The project sponsors undeniably are interested in avoiding minimum releases from Tongue River Dam during as many project activities as is feasible. However, certain components of the rehabilitation effort at Tongue River Dam will require downstream releases too small to meet everybody's needs. The project sponsors understand this fully but further recognize the importance of eliminating the dam safety deficiencies at Tongue River Dam. The agricultural mitigation plan to be negotiated with TRWUA hopefully will offset some of these impacts.

151 4.7.1.1 THE FIVE MEMBER ADVISARY COMMITTE SHOULD HAVE A MEMBER OF THE T & Y DITCH.

151 **See response to Comment number 137.**

152 DOES THE INTERM PLAN CALL FOR, IN A DROUGHT YEAR, DROPPING THE LEVEL TO DEAD STORAGE LEVEL (1,500 AF)? COULD STORAGE VOLUME BE INCREASED TO HELP AVOID THIS?

152 The current interim operating plan for the Tongue River Reservoir requires maintenance of a reservoir pool of at least 15,000 af. The construction-related interim operating plan requires a target minimum pool of 9,000 af for rehabilitation of the low-level outlet works.

153 4.7.1.2 DECREASED FLOW DURING THE FALL OF 1997 COULD BE DETREMENTAL TO IRRIGATORS THAT ARE RUNNING WATER LATE IN ORDER TO FILL THE SOIL PROFILE IN CASE THERE WOULD BE LIMITED FLOW IN THE SPRING.

153 **See response to Comment number 145.**

154 4.7.2 UNDER EXTREAME FLOOD DAMAGE, WOULD THERE BE THE RIGHT TO RETURN THE

154 The project sponsors are not proposing changes in the responsibility or rights of private landowners to reclaim lands lost to flooding. Contact your county floodplain administrator for additional information regarding this issue.

Comment Number

PAGE 3

STREAM CHANNEL IN CASE LAND PARCELS ARE CUT OFF & ISOLATED ?

155 4.7.2/4.7.3 I SEEMS THAT UNDER ALT#1 THERE WOULD BE 30,000 AF AND FOR ALT# 45,000 AF STORAGE. WOULD IT BE POSSIBLE TO INCREASE THESE LEVELS TO ENSURE A MORE STABLE SUPPLY?

156 WHY ONLY 30,000 AF FOR ALT#1? LOOKING AT THE LONG TERM THE RCC WOULD BE PREFERED, AS THE FLOOD EVENTS WOULD BE NEGLIGIBLE.

157 ALT#1 LONG TERM IMPACT WOULD BE MODERATE TO MAJOR AND SIGNIFICANT, WHY SO?

158 4.14.1.2 IF 4,000 ac. OF HAY, SILAGE AND SMALL GRAINS COULD BE AFFECTED AND 11,000 ac. THAT RECIEVE PARTIAL IRRIGATION MAY NOT HAVE SUFFICIENT WATER AND AG LOSSES WOULD DEPEND ON PRECIPITATION — WHY IS THIS ASPECT NOT BEING ADVERTISED TO THE FARMERS & RANCHERS?

159 THIS COULD BE DEVASTATING TO MANY OPERATIONS WITHOUT ADVANCED PLANNING. WOULD INCREASED STORAGE DURING CONSTRUCTION BE OFFSET BY agricultural LOSSES DOWNSTREAM?

160 4.24 WHY IS THE "TRIBE" CREDITED WITH RETURN FLOW AND NOT OTHERS?

161 WHEN STORED WATER SHORTAGES ARE EXPERIENCED

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155 *Yes, it may be possible to increase the storage during construction depending on the plan adopted for spillway rehabilitation. As stated in the* ***response to Comment number 144****, the potential for storage during construction is much better for Alternative 2 than for Alternative 1, but the exact amount of storage that can be allowed during construction cannot be determined until the design is complete.*

156 ***See response to Comment number 144*** *for information regarding water storage during construction. As pointed out in the EIS, the ability of the labyrinth weir alternative to provide flood protection downstream would be lower than that of the RCC alternative.*

157 *Under the labyrinth weir alternative (Alternative #1), discharges for the 5, 10, 25, 50, 100, and 500 year floods would increase by an average of 43 percent. This moderate to major increase in flood discharges over existing conditions is considered to have potential for a significant impact because it would increase the area of the floodplain and possibly flood damage. The area of the 100-year floodplain would increase by 16 percent, and the average floodwater depth would increase by 23 percent.*

158 *The project impacts to downstream irrigated lands are being described in the public involvement process and have been fully acknowledged in the EIS (****see Section 4.14.1.2****). As you indicate, there would be direct impacts to 4,000 acres of irrigated hay and small grains during the 2 years of dam rehabilitation. The EIS process is the mechanism by which the project sponsors "advertise" these possible impacts. The Tongue River Water Users Association and the Tongue & Yellowstone River Irrigation District are involving their members in this process. Dam rehabilitation may reduce downstream water for irrigation during the 2 years of construction (see* ***Section 2.3.9.2*** *for agricultural mitigations).*

159 *The proposed dam rehabilitation would occur in the years 1997 and 1998, so farm operators would have approximately 1-year of advance notice. Each construction alternative should provide approximately 30,000 to 45,000 acre feet of water storage for contracted irrigation deliveries in each of the two affected irrigation seasons. Average water contract deliveries at present are 32,500 af. The project sponsors will do everything possible to store as much water for irrigation as is possible during project rehabilitation.*

Comment Number

PAGE 4

WHY WOULD IT BE SHARED BY ALL WATER RIGHT HOLDERS? DOESN'T SENIOR WATER RIGHTS MEAN ANYTHING? HOW WOULD THIS BE DONE? LIMIT TIME OF PUMPING? LIMIT FLOW OF PUMP? HOW WOULD THIS BE MONITORED?

162 SINCE THE TRIBE DOES NOT USE THEIR WATER, WHY DO THEY STILL HAVE WATER RIGHTS? ISN'T IT, "USE IT OR LOSE IT"? WHY GIVE THE TRIBE MORE WATER WHEN THEY DON'T USE WHAT THEY ALREADY HAVE?

163 MY MAIN CONCERNS ARE FOR ALL IRRIGATORS ALONG THE RIVER TO HAVE ADEQUATE WATER DURING CONSTRUCTION YEARS AND LONG TERM DAMAGE FROM FLOODS BE MINIMAL.

THANK YOU FOR YOUR TIME IN REPLY TO THESE COMMENTS AND QUESTIONS.

SINCERELY

REX MONGOLD
TONGUE RIVER FARM
MILES CITY, MT

160 *The Tribe's credit for return flows was a result of Northern Cheyenne-Montana Reserved Water Rights Compact negotiations.*

161 *As stipulated in the Compact, stored water shortages will be shared pro-rata among all stored water contract holders and the Tribe. This pro-rata approach is the same means of dealing with stored water shortages as that which exists currently. Decreed water users will not share in stored water shortages; thus the Compact will result in no impact to the priority of decreed rights. Until stored water shortages are experienced, the project sponsors cannot speculate as to how the pro-rata provisions will be implemented among stored water contract holders. That responsibility will fall on the advisory committee that will be chartered with reservoir operations (see discussion of advisory committee included in the* ***response to Comment number 10****).*

162 ***Section 1.4 of the EIS*** *describes the background (including the purposes) behind the Tribe's federal reserved water right. Essentially, the Tribe's water right is a negotiated amount that satisfies its aboriginal rights to the water (see footnote regarding Winters rights). Because the amount of the Tribe's right was negotiated, and because the Tribe and BIA have committed to future environmental compliance for any specific uses of Tribal water, it is not incumbent upon the Tribe to demonstrate specific uses for the water at present to justify its water right. Although not required, the Tribe for the purposes of discussion, identified possible uses for its compact water.* ***See Section 4.24 of the final EIS*** *for a discussion of these uses.*

163 *The project sponsors understand your concerns and are pursuing alternatives for the proposed Tongue River Basin Project that we feel most adequately address downstream irrigation and flood control. During construction, we are committed to providing as much water for irrigation as possible. Dam safety and flood control are two of the underlying purposes of the proposed project.*

Comment Number

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
215 NORTH 17TH STREET
OMAHA, NEBRASKA 68102-4978

REPLY TO ATTENTION OF
Planning Division

August 25, 1995

RECEIVED
SEP 6 1995

Mr. Edward M. Pettit
Montana Department of Natural Resources
and Conservation
P.O. Box 202301
Helena, Montana 59620-2301

Dear ~~Mr. Pettit~~ Ed:

We have recently had the opportunity to review the Tongue River Basin Draft Environmental Impact Statement (EIS) as well as attend an interagency meeting held on August 15, 1995. At the meeting, we discussed an approach to addressing the purpose of the tribal settlement water that might allow the Corps to approve a Section 404 permit application for repair and expansion of the Tongue River Dam. Accordingly, we are providing the following general comments regarding the Draft EIS. These comments cover two general areas: purpose and need and alternatives. We also have some suggestions on the enhancement and mitigation features of the project.

PURPOSE AND NEED

164 It appears as though the purpose of the project is threefold. These are remedying a dam safety problem, providing additional water to the tribe, and establishing enhanced fish and wildlife habitat. However Chapter one should also provide an equally adequate discussion of need for these three purposes. Under normal circumstances, the Corps of Engineers (Corps) would need a clear demonstration of the need for each of these purposes before we could grant the project approval under the Clean Water Act.

165 Since this is a water supply project, this chapter of the EIS should begin with a discussion of the existing supply; i.e., the average or firm annual yield of the project operated under the current dam safety constraints. Then the EIS should identify the current demand for reservoir water. Presumably, it can be shown that the current demand is greater than the current supply because of the dam safety constraints. Then the EIS normally identifies the need for additional water based on a quantitative forecast for some future demand. For the Tongue River Reservoir, this would normally include tribal, non tribal, and enhancement needs. While we discussed the difficulty in identifying future tribal water needs at the meeting, we did not discuss non tribal or enhancement water needs.

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164 *The **Purpose and Need** section of **Chapter 2** has been expanded to further clarify the project purpose and need.*

165 *The estimated firm annual yield of the Tongue River Reservoir from reservoir storage only at its present maximum capacity of 67,000 af is approximately 47,000 afy. Firm annual yield is the amount of water a reservoir can supply during the worst of a series of drought years. For the Tongue River Reservoir, the firm annual yield is less than the capacity because, if there were 2 very dry years in a row, the reservoir would not fill the second year. Actually, the existing firm annual yield for the Tongue River Reservoir is less because the reservoir should not be filled to full pool due to the unsafe spillway.*

Raising the Tongue River Dam, as proposed, would increase the full pool reservoir capacity to about 80,000 af, and the firm annual yield to about 54,000 afy. Currently, there are contracts for 40,000 afy of water stored in the reservoir. With the proposed Tribal water developments, demands for stored water would increase to a maximum of 60,000 afy. During extremely dry years, when reservoir yield is less than the demand, the Tribe and existing users will be short of water. Increasing the impoundment at Tongue River reservoir is not being proposed for the fish and wildlife habitat enhancement component of the project; thus, stored water will not be used for enhancement activities.

Comment Number

166 The dam safety need is probably the easiest of the three to define. For one thing, it is not a water supply problem. This does not need to be a detailed discussion of engineering or design rather a brief, easy to understand explanation of what specifically is making the dam unsafe. For example, if the likely-hood of overtopping or spillway failure are issues making the dam unsafe, they need to be stated and briefly explained in this section of the EIS.

We have no concern regarding the water rights aspects of this project. The 1992 Water Rights Settlement Act clearly addresses water rights so it is beyond the scope of our review. However, the need or demand for this water right has not been established. As I stated above, this is something which normally must be addressed before we can provide Clean Water Act clearance for a project. For the Tongue River Reservoir, the simplest solution would be for the partners in the project to identify the most likely uses of the water and then go through a typical supply and demand analysis to justify the need for the water. At the meeting we learned that this would be very difficult since the water rights settlement was based on a future need and not an existing one.

167 Typically in a situation like this we would tell the applicant that we could not approve the permit application, and they should reapply when they have developed a demand or use for the water. And, if it were not for dam safety problem we would be doing that here. Although detailed uses of the water cannot be identified, the Final EIS should provide a discussion of the possible uses of the water so that the Purpose and Need chapter has as much information as possible on the uses of the water. Perhaps some of the information on the uses of the water that was used in the settlement negotiations can be drawn on to improve this chapter.

168 The third purpose of the project, environmental enhancement, also needs to have a discussion on need. As mentioned above, we did not really have the time to discuss this at the meeting, but if the reservoir is also to provide water for enhancement, then Chapter 1 should include a discussion on the nature of the environmental degradation that exists in the Tongue River. This should be as specific as possible identifying the ecosystem elements that need to be enhanced; i.e., certain kinds of flows, water quality, or certain kinds of habitat structure. This level of detail is needed in order to develop and evaluate alternative ways of accomplishing the enhancement.

166 *Dam safety concerns at Tongue River Dam include the hydraulic performance of the spillway and stilling basin. The poor hydraulic performance of the spillway creates turbulence in the spillway flows that causes a variety of structural problems for the spillway walls and floor at relatively low flows. Further, the poor hydraulic design of the stilling basin allows flow to erode the tail of the spillway. These two problems combine to threaten the structural safety of the spillway, although repairs to the spillway have reduced but not eliminated the chance of these problems developing again. This same information has been incorporated into the project purpose and need statement in* ***Chapter 1 of the final EIS.***

167 *Since the August 15, 1995 interagency meeting in Billings, the Northern Cheyenne Tribe has identified its present and reasonably foreseeable use of the increased reservoir storage that it will have a right to under its federal reserved water right.* ***See Section 4.24 of the final EIS*** *for specific information related to Tribal water use.*

168 *It is not anticipated at this time that any of the increased reservoir storage water would be used for the enhancement portion of the project. When specific enhancement projects are proposed, those requiring water will include site specific provisions for water source development. The need for enhancement in the project area was seen by Congress as a general need. During project-related activities, as the project sponsors identify specific enhancement needs, enhancement funds would be assigned accordingly. The programmatic treatment of enhancement in the EIS is aligned with Congress's intent when appropriating project-related enhancement funds.*

Comment Number

-3-

ALTERNATIVES

169 Because each of the three project purposes is technically independent of the others; i.e., you could theoretically have three separate single purpose projects rather than a combined one, this chapter of the EIS needs to provide the information and rationale leading up to the decision to combine all three purposes rather than pursue each separately. The reason for this is so that we will be able to adopt the alternative analyses you went through for our Section 404(b)(1) evaluations. This means that the EIS needs to provide sufficient information to demonstrate that the Tongue River Reservoir is the least damaging way to meet all three purposes when compared to three single purpose projects.

For the 20,000 AF water supply component, you will need to identify each of the alternative ways you considered for supplying the water and then give the specific reasons; i.e., too costly, not enough water yield, environmental impacts, that each was eliminated. Specific information and data should be provided to support the conclusion.

For the environmental enhancement, the EIS will again need to identify the various alternative ways you considered during the negotiations for accomplishing the enhancement. If water is a requirement, then this would also include the alternative ways that the water could be supplied. Again, the rationale and supporting information on why you chose to combine the enhancement element with the Tongue River Reservoir should be included in the EIS.

For the dam safety component, the information you have presented on the alternative designs is good. We believe you should also include the cost of a single purpose dam fix alternative in order to compare it to the proposed alternative.

As we discussed at the meeting, the key to our ability to approve the proposed project will be based on being able to demonstrate that the single purpose options are unacceptable and that the alternative of combining the purposes is the best. Along this line, one of the specific things we agreed to do was to include information on the cost of a two phase alternative; the first phase being a safety fix and the second phase (to be constructed when the 20,000 AF would be needed) would be an expansion of the dam to be able to store the 20,000 AF. The general belief at the meeting was that the cost of the two phase option would be expensive enough, when compared to the single

[169] *See response to Comment number 90.*

Comment Number

-4-

phase option currently proposed, that it could be eliminated as not reasonable/practical. The cost data is needed to verify this belief.

ENHANCEMENT

170 The idea of enhancing the environment is a fantastic one. This is another area, however, that needs more explanation. The Final EIS needs to demonstrate a baseline for this enhancement proposition. It could be in the demonstration of need for the purpose but somewhere the EIS needs to show historic conditions, the events and their impacts contributing to degradation, present conditions, and a more specific plan for enhancement. The enhancement purpose seems very loosely tied to this project's overall goal.

171 It is understood that funding is a tie to the project, however, the Final EIS needs to identify a comprehensive implementation plan, a basic breakdown of how the money will be spent and when it will be spent in order to be able to demonstrate if the purpose and need are being met and to identify any impacts or other Federal actions. For instance, it is possible that some of the enhancement measures that could be constructed could require approval under the Clean Water Act.

If the intention of this Final EIS is to provide the consideration and justification for enhancement that the Summary, Purpose and Need, and Development of Alternatives sections leads one to believe, it should include the same discussion of economics, comprehensive implementation, and site specific plans as the dam safety and water supply purposes have. If this is not the intention of this Final EIS or this project, then the enhancement purpose and its funding should probably be eliminated from this project. We believe that this purpose needs considerable more detail before it could receive Clean Water Act approval.

MITIGATION

172 Prior to the establishment of mitigation plans, a more detailed analysis of impacts needs to be provided. If establishing higher pool elevations will require the inundation of jurisdictional wetlands as well as the inundation of other habitat types, the Ffinal EIS needs to account for the specific types, functions, and requirements of wetlands and habitats that inundation will affect. It needs to account for wildlife and fisheries use of these areas, vegetation types, soil types, and recreational use of these areas at the least. At present, the Draft EIS seems to quantify impacts and justify inundation based

170 *As stated in the **response to Comment number 168**, the programmatic treatment of the enhancement component of the project is in line with Congressional intent. At the time the Settlement Act was passed, no specific need for enhancement was identified. Congress intended that funding would be available to pursue such proposals as a need for enhancement projects or features is identified. Appropriate environmental compliance activities will be conducted during specific project planning.*

171 ***See responses to Comment numbers 138 and 168**. As needs are identified for enhancement projects and those projects are planned, resource-specific analyses will be conducted. These analyses will include economics, and whatever is needed to comply with the Clean Water Act, and other federal requirements.*

172 ***See responses to Comment numbers 89, 94, 95, 115 and 116** for a more detailed account of the project sponsors' efforts to comply with Section 404 of the Clean Water Act.*

Comment Number

-5-

on the development of new riparian areas at the new shoreline level. However, there is little information which would support this conclusion.

For example, the EIS needs to identify existing conditions and demonstrate how new reservoir levels will establish no net loss of resources. If the discussion of soil types, vegetation, wildlife, and their respective baseline requirements proves too detailed and/or lengthy for entire incorporation to the text of the Final EIS, it could be included as an appendix to the EIS. This needs to be done both upstream and downstream of the dam for fish and wildlife, vegetation, and recreational use.

173 From the meeting we understand that mitigation funding is separate from enhancement. We agree that these should be two separate aspects of the project. We also believe that the Final EIS should be very clear that these two aspects of the project are separate.

We appreciate the opportunity to review this Draft EIS and look forward to working through the rest of this project. It is also worth mentioning that we have reviewed the comments made by the EPA in their letter dated August 24, 1995, (including enclosures) and are in general concurrence with them. If there are any questions regarding the comments made in this letter, please contact Randy Sellers of my staff at (402) 221-3054.

Sincerely,

Dick

Richard D. Gorton
Chief, Environmental
Analysis Branch
Planning Division

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173 *Comment noted. Project-related mitigation and enhancement activities indeed are two separate components.* ***Sections 2.3.9.3 and 2.3.9.13 of the EIS*** *have been expanded to clarify this point.*

TONGUE RIVER BASIN PROJECT

MT Department of Natural Resources and Conservation

Northern Cheyenne Tribe

United States Bureau of Reclamation

Public Hearings to receive comments on the Draft Environmental Impact Statement to evaluate the environmental effects of the Tongue River Basin Project in Southeastern Montana.)

TRANSCRIPT OF PROCEEDINGS

BE IT REMEMBERED, that a public hearing in the above matter was held at the Busby School Auditorium, Busby, Montana, on the 17th day of July, 1995, beginning at the hour of 12:30 p.m. before Carol Hendrickson, Registered Professional Reporter, Notary Public.

* * * * * * * * * * *

A P P E A R A N C E S

FACILITATOR:

TIM PERSONIUS
Bureau of Reclamation
Billings, MT

REPRESENTING MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION:

EDWARD M. PETTIT
Environmental Coordinator
Helena, MT

JOHN SANDERS
Field Engineer
Helena, MT

REPRESENTING UNITED STATES BUREAU OF RECLAMATION:

MARK ALBERS
TRB Project Coordinator
Billings, MT

REPRESENTING THE NORTHERN CHEYENNE TRIBE:

ERNIE ROBINSON
TRB Project Coordinator
Lame Deer, MT

BUTCH SOOKTIS
Tribal Representative & Translator
Lame Deer, MT

REPRESENTING MORRISON-MAIERLE-CSSA:

MICHAEL A. FILLINGER
President, MME
Helena, MT

AFFIDAVIT

I, Carol Hendrickson, Registered Professional Reporter in and for the State of Montana, hereby certify to the following facts, to wit:

That on the 17th day of July, 1995, at 12:30 p.m., I appeared at the Busby School Auditorium, Busby, Montana, for the purpose of reporting the above-referenced public hearing;

That in attendance for the taking of the hearing were the people listed on the preceding Appearance page;

That myself and the people in attendance stayed at the hearing site for three hours and no orel comments were given;

That one written comment was delivered by John Doyle, Big Horn County Commissioner, which was retained by Mr. Pettit.

Carol Hendrickson
Carol Hendrickson
Registered Professional Reporter

STATE OF MONTANA)
)
COUNTY OF LEWIS & CLARK)

Subscribed and sworn to before me on this 2nd day of August, 1995.

Carol Hendrickson
Notary Public in and for the State of Montana
My Commission Expires 2/9/98

TONGUE RIVER BASIN PROJECT, DRAFT EIS PUBLIC HEARING

Location: BUSBY
Date: 7.17.95 12:30 p.m.
Page 1 of __

Name (PLEASE PRINT)	Representing (PLEASE PRINT)	Mailing Address (PLEASE PRINT)
John Doyle	B's Horn County	Hardin MT
JOHN GLENMORE		BOX 112 BUSBY MT 59016

TONGUE RIVER BASIN PROJECT

MT Department of Natural Resources and Conservation

Northern Cheyenne Tribe

United States Bureau of Reclamation

Public Hearings to receive comments on the Draft Environmental Impact Statement to evaluate the environmental effects of the Tongue River Basin Project in Southeastern Montana.)

TRANSCRIPT OF PROCEEDINGS

BE IT REMEMBERED, that a public hearing in the above matter was held at the Dull Knife College Auditorium, Lame Deer, Montana, on the 17th day of July, 1995, beginning at the hour of 5:30 p.m. before Carol Hendrickson, Registered Professional Reporter, Notary Public.

* * * * * * * * * *

HENDRICKSON COURT REPORTING
Helena, Montana (406)443-0080

1

A P P E A R A N C E S

FACILITATOR:

TIM PERSONIUS
Bureau of Reclamation
Billings, MT

REPRESENTING MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION:

EDWARD M. PETTIT
Environmental Coordinator
Helena, MT

JOHN SANDERS
Field Engineer
Helena, MT

REPRESENTING UNITED STATES BUREAU OF RECLAMATION:

MARK ALBERS
TRB Project Coordinator
Billings, MT

REPRESENTING THE NORTHERN CHEYENNE TRIBE:

ERNIE ROBINSON
TRB Project Coordinator
Lame Deer, MT

BUTCH SOOKTIS
Tribal Representative & Translator
Lame Deer, MT

REPRESENTING MORRISON-MAIERLE-CSSA:

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President, MME
Helena, MT

HENDRICKSON COURT REPORTING
Helena, Montana (406)443-0080

2

AFFIDAVIT

I, Carol Hendrickson, Registered Professional Reporter in and for the State of Montana, hereby certify to the following facts, to wit:

That on the 17th day of July, 1995, at 5:30 p.m., I appeared at the Dull Knife College Auditorium, Lame Deer, Montana, for the purpose of reporting the above-referenced public hearing;

That in attendance for the taking of the hearing were the people listed on the preceding Appearance page;

That myself and the people in attendance stayed at the hearing site for three hours and no oral comments were given.

Carol Hendrickson
Carol Hendrickson
Registered Professional Reporter

STATE OF MONTANA)
)
COUNTY OF LEWIS & CLARK)

Subscribed and sworn to before me on this 2nd day of August, 1995.

Carol C. Hendrickson
Notary Public in and for the
State of Montana
My Commission Expires 2/9/98.

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3

TONGUE RIVER BASIN PROJECT

MT Department of Natural Resources and Conservation

Northern Cheyenne Tribe

United States Bureau of Reclamation

Public Hearings to receive)
comments on the Draft)
Environmental Impact Statement)
to evaluate the environmental)
affects of the Tongue River)
Basin Project in Southeastern)
Montana.)

TRANSCRIPT OF PROCEEDINGS

BE IT REMEMBERED, that a public hearing in the above matter was held at the Muddy Community Center, Muddy, Montana, on the 18th day of July, 1995, beginning at the hour of 12:30 p.m. before Carol Hendrickson, Registered Professional Reporter, Notary Public.

* * * * * * * * * * *

A P P E A R A N C E S

FACILITATOR:

TIM PERSONIUS
Bureau of Reclamation
Billings, MT

REPRESENTING MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION:

EDWARD M. PETTIT
Environmental Coordinator
Helena, MT

JOHN SANDERS
Field Engineer
Helena, MT

REPRESENTING UNITED STATES BUREAU OF RECLAMATION:

MARK ALBERS
TRB Project Coordinator
Billings, MT

REPRESENTING THE NORTHERN CHEYENNE TRIBE:

ERNIE ROBINSON
TRB Project Coordinator
Lame Deer, MT

BUTCH SOOKTIS
Tribal Representative & Translator
Lame Deer, MT

REPRESENTING MORRISON-MAIERLE-CSSA:

MICHAEL A. FILLINGER
President, MME
Helena, MT

AFFIDAVIT

I, Carol Hendrickson, Registered Professional Reporter in and for the State of Montana, hereby certify to the following facts, to wit:

That on the 18th day of July, 1995, at 12:30 p.m., I appeared at the Muddy Community Center, Muddy, Montana, for the purpose of reporting the above-referenced public hearing;

That in attendance for the taking of the hearing were the people listed on the preceding Appearance page;

That myself and the people in attendance stayed at the hearing site for three hours and no oral comments were given.

Carol Hendrickson
Carol Hendrickson
Registered Professional Reporter

STATE OF MONTANA)
)
COUNTY OF LEWIS & CLARK)

Subscribed and sworn to before me on this 2nd day of August, 1995.

Carol Hendrickson
Notary Public in and for the
State of Montana
My Commission Expires 2/9/98

TONGUE RIVER BASIN PROJECT

MT Department of Natural Resources and Conservation

Northern Cheyenne Tribe

United States Bureau of Reclamation

Public Hearings to receive comments on the Draft Environmental Impact Statement to evaluate the environmental effects of the Tongue River Basin Project in Southeastern Montana.)

TRANSCRIPT OF PROCEEDINGS

BE IT REMEMBERED, that a public hearing in the above matter was held at the St. Labre Auditorium, Ashland, Montana, on the 18th day of July, 1995, beginning at the hour of 5:30 p.m. before Carol Hendrickson, Registered Professional Reporter, Notary Public.

* * * * * * * * * *

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Helena, Montana (406)443-0080

1

A P P E A R A N C E S

FACILITATOR:

TIM PERSONIUS
Bureau of Reclamation
Billings, MT

REPRESENTING MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION:

EDWARD M. PETTIT
Environmental Coordinator
Helena, MT

JOHN SANDERS
Field Engineer
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REPRESENTING UNITED STATES BUREAU OF RECLAMATION:

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Lame Deer, MT

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REPRESENTING MORRISON-MAIERLE-CSSA:

MICHAEL A. FILLINGER
President, MME
Helena, MT

REPRESENTING FISH, WILDLIFE & PARKS, MILES CITY:

PHIL STEWART
Fisheries Supervisor
Miles City, MT

HENDRICKSON COURT REPORTING
Helena, Montana (406)443-0080

2

AFFIDAVIT

I, Carol Hendrickson, Registered Professional Reporter in and for the State of Montana, hereby certify to the following facts, to wit:

That on the 18th day of July, 1995, at 5:30 p.m., I appeared at the St. Labre Auditorium, Ashland, Montana, for the purpose of reporting the above-referenced public hearing;

That in attendance for the taking of the hearing were the people listed on the preceding Appearance page along with seven (7) people whose signatures are on the sign-in sheet retained by Mr. Pettit, a copy of which is attached;

That myself and the people in attendance stayed at the hearing site for three-and-a-half hours and the following proceedings were had, to-wit, after John Sanders's oral presentation off the record:

* * * * * * * * *

MR. PERSONIUS: Thank you very much, John, for that great introduction. We'd like to go to the comments section of the meeting tonight. We'd like to take your comments formally if you would so desire to speak. We have a court reporter who'll take these down verbatim to make sure there is no mistaken communication.

You can, as John said, leave written comments; and we have some forms in the back of the room or you can talk to some of us a little later at the meeting. I'm simply here to make sure we get everyone's comments; and if I think you are going on a little too long, I will remind you to try and stay to the point. We are addressing comments on the Draft EIS.

If you have questions about the EIS as opposed to comments, we have some subject-matter experts with us tonight who know something about how the document was prepared and they can maybe help you understand some things if you just have a question about something. So with that, we will turn it over to the first commenter. Do we have volunteers?

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MR. LEI: Do you have any opinions as to
174 the impact of the fishery for each alternative of the dam or the spillway?

(Off-the-record discussion.)

MR. LEI: I don't know who to ask. Is there a longer construction period for, say, the RCC as opposed to the weir type? Is there any difference
175 in, say, a year or how long it would actually take to make the Project to one or the other?

(Off-the-record discussion.)

MR. LEI: Well, like, I'm sure there's
176 going to be a lot of men at work. Will they be able to work through the winter or will it be during the summer, a revolving-type. . .

(Off-the-record discussion.)

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MR. LEI: Are there any ideas as to the cost differences, roughly? 177

(Off-the record discussion.)

MR. LEI: Is there any big advantage to the labyrinth weir over the RCC? 178

(Off-the-record discussion.)

MR. LEI: Is there any indication as to which way would probably be the best way for our situation here or is that going to be up to the consulting engineers? 179

(Off-the-record discussion.)

MR. LEI: And that meaning as far as the fish and the wildlife and whatnot that would be there, it would be less impact on them if you went with the RCC? 180

(Off-the-record discussion.)

UNIDENTIFIED COMMENTER: Has the State of Wyoming had anything good or bad to say about the Project or how it's going to affect them? 181

(Off-the-record discussion.)

UNIDENTIFIED COMMENTER: Are we going to have rights to the shoreline, too, on the property or rights to, like, access along the shore? 182

(Off-the-record discussion.)

UNIDENTIFIED COMMENTER: I was wondering,

I guess haven't really looked at the plan as far as the east side, but is there going to be any development on the east side of the reservoir or is it going to basically stay like it is? 183

(Off-the-record discussion.)

MR. ROBINSON: I'd like to make a comment. My name is Ernie Robinson. I live here on the Tongue River. I also work for the Project, so the opportunity to speak isn't always -- you can't portray your personal feelings so much in being a part of the Project; but there are some concerns of my family, people, my neighbors here on the Tongue River regarding the Project. First of all, we want a safe dam, for all practical purposes to be called safe. 184 Many times in these last four years we haven't felt very safe, particularly in the spring with all of the moisture, precipitation. We haven't been able to sleep well at night, so we want to see the dam repaired.

The other side of it, speaking as a landowner, speaking as a user of the Tongue River Basin and its resources and particularly the Tongue River, in 1937 when the dam was first built, we didn't have things such as NEPA. They didn't have things in place to really protect the natural resources in the

area. Consequently, the dam was built; and up to this point, everything that we have on cause and effect of the dam is all hindsight, so we're utilizing that hindsight and going into a new facility, basically, and a facility that will carry us on for a lot of years.

For a handful of people, the Tongue River Dam serves a real economic benefit. For others who live along the Tongue River, particularly those who live in towns or have development land holdings or those that live in the Basin, the ability to use the Tongue River is very limited. Particularly now in Wyoming, Billings, the Tongue River has become a place to go to, and it's come into its own as a recreational facility, so as you go there, particularly on holidays, you can't hardly find a place to camp. 185 The users on the reservoir have become -- there's an uneasy feeling between recreational users such as boaters, jet skiers and fishermen or even families, to bring their families to the shore and have children along the shore. So I believe that we need to utilize more of the shoreline and even segregate certain areas to keep it a safe place to recreate, for gatherings, to fish. 185 CONT. Some people will fish because they need to eat the fish.

Down lower in the valley, the Tongue River Dam, itself, and the expense that goes into it could be questionable to a lot of people as far as the expense is concerned because actually what it is is an irrigation pond and it serves roughly 75, I believe, users in the Tongue River Valley. So per capita-wise, it's a pretty expensive dam. 186

As a user of the Tongue River and its resources, particularly the fisheries, you take the family to boat or walk the river, access is a great problem. I believe that the State of Montana, the Northern Cheyenne Tribe, in conjunction, should work with landowners either through purchase, which is being considered, but I think we need to look at a larger scale in developing the fisheries at this point into several access points that are available on the river. 187 Within several weeks these places are fished out every year and these nongame species are all that's left, carp, suckers, bullheads, and there is no real program in the community that we see, at least formally see, that we have any real management here on the Tongue River. We would like to see more fish. We would like to see more game fish or white fish that we eat. 188 The possibility of it being a sport fishery may be slim, so I don't speak towards that as much as I do

as a place for our community here in the Tongue River
Valley and the surrounding communities, from Broadus,
Miles City, on the Tongue River, Lame Deer, Busby,
Otto Creek, and the people around who come to the
188 CONT. Tongue River. We need more places to go.
Particularly this year along the river we even had to
put out warnings in the paper because of the high
water and the unstable conditions of the stream bank,
189 and a lot of the places we lost a lot of the stream
bank. Is that filling in our river or is it going on
down? It certainly is widening it, and what is it
doing for us?
So at some point I think we need more
information coming into our community on what's
190 happening with our river, but in particular we need to
begin to protect it. Agriculture. The initial reason
for building the dam was to bring water to the desert
area, I think was pretty close to a quote on why they
built the Tongue River Dam and why the T & Y Ditch and
some of the irrigation projects that were put in.
Well, that oasis hasn't really come to be yet; but I
believe with good management, certainly the ability is
there and I think all we need is money.
So when we look at this, certainly we have
put in, as we see, there is enough money there to

190 CONT. build a dam; but have we put enough money into
mitigation? I don't suppose any court or any, either
the Tribe or the State or the federal government feels
a social responsibility, and I feel there's certainly
one, to looking, utilizing this hindsight to come up
and correct some of the things, the deficiencies as it
affects the natural resource, itself, in bringing back
the riparian zones they have taken out, all your
feeder streams. I can't say all of them, but a lot of
them, Hanging Woman, I think O'Dell Creek, Logging
Creek, Cook Creek, Stebbins Creek, Reservation Creek,
191 streams that were in place when I was a young man, at
least back in 1964 when I first came to realize a lot
of things here in the Tongue River Valley, but those
particular streams all fed into the Tongue River and
now they don't, or a good deal don't. Some do early
in the spring and they give out, and part of it is
because of poor management.
We should have some laws in place to protect
these things. What we need is to restore them back to
what they were 20 years ago, 30 years ago, so I think
in the enhancement mitigation we haven't been shown a
191 CONT. very good effort by the contributing response source
to meet the need that's there simply because there
hasn't been really an identification of all the needs.

The Northern Cheyenne came to the table and said we
have a need; and there's going to be a fair amount of
money that has been contributed for the Northern
Cheyenne, but we represent a very small part of the
Tongue River resource. So I believe that we need to
look at the state, the federal government and, with
the help of the Northern Cheyenne Tribe, need to look
191 CONT. at acquiring more monies for enhancement mitigation
because there are a lot of us that live in the Tongue
River Valley that don't irrigate but certainly want to
use and do use the resource.
(Off-the-record discussion.)
MS. WHITE WOLF: I don't know if I should
be here making a comment in the Ashland district. I
will say something real brief.
My name is Adeline White Wolf, Chairman of
the Culture Commission. As an individual Northern
Cheyenne member, I have a concern for the cultural,
like, the plants and the herbs and the ceremonial
192 paints and all these different cultural uses that are
used by our Northern Cheyenne people; and a lot of
times our ceremonial people go to the Tongue River Dam
to pick their plants, their herbs, and sometimes they
get their willows for the sweat lodges. All these
192 CONT. things that are a concern up there, are they going to

be disturbed in any way when this project starts up
over there for development?
192 CONT. The Northern Cheyenne Culture Commission is
saying that we need to be involved at the beginning of
the process to hold a ceremony up there before any
development starts. Our concern is that some of these
areas, if they are going to be disturbed, like the
water in our culture, our traditional belief is that
the water should be flowing all the time, it shouldn't
be stopped; and if it's going to be stopped or be
192 CONT. dammed, that we need to have a ceremony so that our
people don't -- There's a lot of beliefs and things
that if you do things to, like, disturb the water any
way or damage the water, that things can happen to our
people and the Tribe, and we really believe that and I
think to do, like, a ritual process and a ceremony
192 CONT. before any development starts, like just the water
ceremony, the blessing of the water and all this, I
think that needs to happen before anything goes on up
there as far as our culture concerns.
On the other side, I'd like to see a better
193 management system for, like, our people in Ashland,
our tribal members and other people where they are
more secure, that they are more safe, and that they
don't have to worry about a flood and that I think if

we had real good management up there to improve the dam, the water spill and all that, I think we need to look at it on both sides, culturally for our Tribe, our interests there, and economically on this side for development, for a better management system. That's my brief comment. Thank you. 193 CONT.

(Off-the-record discussion.)

MR. SOOKTIS: I have a question. Are there going to be additional comments from the Commission?

(Off-the-record discussion.)

MS. WHITE WOLF: In addition to Bill Tall Bull's comments or the tribal consultation, like walking the sites, continue to hold ceremonies out there? I think that's the concern that our Culture Commission has, is to have a ceremony and do it properly in the traditional way. I think the development can start after our part is done as far as tribal consultations.

(Off-the-record discussion.)

MR. ROBINSON: One of the things that's available here tonight, and I know we can't answer everything, but as it relates to the EIS -- wait, the DEIS. It's still in draft form. Representatives from Morrison-Maierle, the firm that was contracted by the

State to produce the document, representatives of the State and the Tribe and the Bureau of Reclamation that have reviewed it sat down and virtually went over the thing almost word for word several times to prepare it; and as I mentioned earlier, being close to it sometimes you're kind of blind to certain things because you have a mission. But as you step back and your relatives question you, as I inadequately tried to address in my comments, and maybe Phil here can help out, but I guess the big question of the people in this Valley is, is the management program, you know, the new term that's being used in natural resource management is ecosystem management; and you can't very well isolate the Tongue River itself from the rest of the Basin. As you mentioned earlier, John, it's the Tongue River Basin Project. Is it realistic, do you think, Phil, to expect that we might be able to get into that particular type of management, the ecosystem of the Tongue River Basin in Montana? 194

(Off-the-record discussion.)

MR. ROBINSON: I would like to see any savings from the Project in construction costs committed back into other areas that we feel are important. 195

* * * * * * * * * *

I further certify that the above-indicated remarks were made and that they were true and correct.

Carol Hendrickson
Carol Hendrickson
Registered Professional Reporter

STATE OF MONTANA)
)
COUNTY OF LEWIS & CLARK)

Subscribed and sworn to before me on this 2nd day of August, 1995.

Carol Hendrickson
Notary Public in and for the
State of Montana
My Commission Expires 2/9/98

TONGUE RIVER BASIN PROJECT DRAFT EIS PUBLIC HEARING

Location: Ashland

Date: 7.18.95

Page 1 of __

PLEASE PRINT Name	PLEASE PRINT Representing	PLEASE PRINT Mailing Address
Kenneth A. Kania	SELF	Box 657 Ashland MT 59003
Herbert Beartchum Sr.	SELF	Box 5851 Lame Deer MT 59043
[illegible]	N.C. Tribe	Box 128 Lame Deer MT 59043
[illegible]	A-L Ranch	Box 242 Ashland MT 59003
[illegible]	Ranch	Box 52 Ashland Mont 5900[illegible]
Charlie Lee	Fisherman	Box 13 Ashland MT 59003
Phil Stewart	MDFW&P	Box 1630 Miles City MT 59301
[illegible]	Self	Lame Deer, MT 59043

TONGUE RIVER BASIN PROJECT

MT Department of Natural Resources and Conservation

Northern Cheyenne Tribe

United States Bureau of Reclamation

Public Hearings to receive comments on the Draft Environmental Impact Statement to evaluate the environmental effects of the Tongue River Basin Project in Southeastern Montana.)

TRANSCRIPT OF PROCEEDINGS

BE IT REMEMBERED, that a public hearing in the above matter was held at the Catholic Church, Birney Village, Montana, on the 19th day of July, 1995, beginning at the hour of 12:30 p.m. before Carol Hendrickson, Registered Professional Reporter, Notary Public.

* * * * * * * * * *

HENDRICKSON COURT REPORTING
Helena, Montana (406)443-0080

1

A P P E A R A N C E S

FACILITATOR:

TIM PERSONIUS
Bureau of Reclamation
Billings, MT

REPRESENTING MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION:

EDWARD M. PETTIT
Environmental Coordinator
Helena, MT

JOHN SANDERS
Field Engineer
Helena, MT

REPRESENTING UNITED STATES BUREAU OF RECLAMATION:

MARK ALBERS
TRB Project Coordinator
Billings, MT

REPRESENTING THE NORTHERN CHEYENNE TRIBE:

ERNIE ROBINSON
TRB Project Coordinator
Lame Deer, MT

BUTCH SOOKTIS
Tribal Representative & Translator
Lame Deer, MT

REPRESENTING MORRISON-MAIERLE-CSSA:

MICHAEL A. FILLINGER
President, MME
Helena, MT

REPRESENTING FISH, WILDLIFE AND PARKS:

KERRY WAEL
Park Ranger
Tongue River State Park

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Helena, Montana (406)443-0080

2

AFFIDAVIT

I, Carol Hendrickson, Registered Professional Reporter in and for the State of Montana, hereby certify to the following facts, to wit:

That on the 19th day of July, 1995, at 12:30 p.m., I appeared at the Catholic Church in Birney Village, Montana, for the purpose of reporting the above-referenced public hearing;

That in attendance for the taking of the hearing were the people listed on the preceding Appearance page and eight (8) community members whose signatures are on the sign-in sheet retained by Mr. Pettit, a copy of which is attached;

That myself and the people in attendance stayed at the hearing site for two-and-a-half hours and the following comments were made, to-wit, after Mr. Sanders's oral presentation:

* * * * * * * * * *

196 MR. WAEL: I have come across a large number of members of the Northern Cheyenne Tribe who have come down to the Tongue River Reservoir for the purposes of recreation. As I talk to them, they are not familiar with where their land is on this reservoir. Many of them believe that they own the entire state park, and that is not the case. They have argued that I was stealing money from them when I asked for their park fees, and I basically had to explain, "No, you are required to pay $3 for your vehicle's entrance fee into the park. If you choose to camp, it is another $4 a night for your camping

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visit."

196 CONT. I have invited many of them to take them to where their land was if they did not want to pay fees, I would show them where it was, but there is a big unfamiliarity among Northern Cheyenne tribal members as to precisely where their property is. I think it's important that they find out where it is before they can get a ticket. It's a $45 fine for not paying your park fees. So that concludes my comment. I think it's real important that they know where that property is.

(Off-the-record discussion.)

197 MR. WAEL: In the diving-cliffs area, there needs to be a responsibility for cleanup. It gets quite messy, cans, bottles, litter everywhere, all along here. It's now starting to fall into the lake, itself, and it starts floating everywhere. So either the Northern Cheyenne Tribe needs to be responsible for cleaning it up along here or we can go in there once in a while and do it. I don't even mind helping out with it, but it's getting to be quite a mess.

MR. SOOKTIS: Kerry, the comments you make there, I did bring them up at the Land Commission meeting a long time before something happened up

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there, you know. Yesterday I brought it back up again.

MR. WAHL: I can't hear you.

MR. SOOKTIS: The comment you made, I brought it to the Land Commission's attention a few weeks ago. We are going to do something like that, maybe put a sign up there or something, or we might fence the area off. We don't know, but we are going to have a meeting this next Wednesday and I will bring it to their attention again before any problems arise over there.

(Off-the-record discussion.)

* * * * * * * * * *

I further certify that the above-indicated remarks were made and that they they are true and correct.

Carol Hendrickson

Carol J. Hendrickson
Registered Professional Reporter

STATE OF MONTANA)
)
COUNTY OF LEWIS & CLARK)

Subscribed and sworn to before me on the day of July, 1995.

Carol J. Hendrickson

Carol J. Hendrickson
Notary Public in and for the State of Montana.
My Commission Expires 2/9/98.

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Date: 7-19-95

PLEASE PRINT Name	PLEASE PRINT Representing	PLEASE PRINT Mailing Address
Kerry Wahl	FWP	HC Box 642, Busby, MT 59016
Kyle Butte	Powder River Co.	Box 78 Volborg Mt. 59351
Arlene Whiteman	N.C. Tribe	P.O. Box 128 Lame Deer, MT 59043
Jannie Parker	No Chey Tribe	Box 128, Lame Deer, Mt. 59043
Conrad Fisher	N.C. Tribe	Box 499 Lame Deer MT 59043
Joanna Sooktis	"	P.O. Box 384 Lame Deer, MT. 59043
Rodney Big Headman	N.C. TRIBE	P.O. Box 1018 Lame Deer MT. 59043
Burton Fisher, Jr.	Army	1028, Lame Deer Mt. 59043
Robbie "	" "	" "

TONGUE RIVER BASIN PROJECT

MT Department of Natural Resources and Conservation

Northern Cheyenne Tribe

United States Bureau of Reclamation

Public Hearings to receive comments on the Draft Environmental Impact Statement to evaluate the environmental effects of the Tongue River Basin Project in Southeastern Montana.)

TRANSCRIPT OF PROCEEDINGS

BE IT REMEMBERED, that a public hearing in the above matter was held at the Holiday Inn Conference Room, Sheridan, Wyoming, on the 19th day of July, 1995, beginning at the hour of 5:30 p.m. before Carol Hendrickson, Registered Professional Reporter, Notary Public.

* * * * * * * * * * *

HENDRICKSON COURT REPORTING
Helena, Montana (406)443-0080

1

A P P E A R A N C E S

FACILITATOR:

TIM PERSONIUS
Bureau of Reclamation
Billings, MT

REPRESENTING MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION:

EDWARD M. PETTIT
Environmental Coordinator
Helena, MT

JOHN SANDERS
Field Engineer
Helena, MT

REPRESENTING UNITED STATES BUREAU OF RECLAMATION:

MARK ALBERS
TRB Project Coordinator
Billings, MT

REPRESENTING THE NORTHERN CHEYENNE TRIBE:

ERNIE ROBINSON
TRB Project Coordinator
Lame Deer, MT

BUTCH SOOKTIS
Tribal Representative & Translator
Lame Deer, MT

REPRESENTING MORRISON-MAIERLE-CSSA:

MICHAEL A. FILLINGER
President, MME
Helena, MT

REPRESENTING FISH, WILDLIFE & PARKS, MILES CITY:

PHIL STEWART, DON HYYPA and JOHN LITTLE

REPRESENTING DEPARTMENT OF ENVIRONMENTAL QUALITY:

TOM RING, Helena
MARK KELLY, Helena

HENDRICKSON COURT REPORTING
Helena, Montana (406)443-0080

2

AFFIDAVIT

I, Carol Hendrickson, Registered Professional Reporter in and for the State of Montana, hereby certify to the following facts, to wit:

That on the 19th day of July, 1995, at 5:30 p.m., I appeared at the Holiday Inn Conference Room, Sheridan, Wyoming, for the purpose of reporting the above-referenced public hearing;

That in attendance for the taking of the hearing were the people listed on the preceding Appearance page and 21 people whose signatures are on the sign-in sheet retained by Mr. Pettit, a copy of which is attached;

That myself and the people in attendance stayed at the hearing site for two hours and the following comments were given, to-wit:

* * * * * * * * * * *

MR. PERSONIUS: I'd like to welcome you to the sixth public hearing in the Environmental Impact Statement series. We're here tonight to solicit comments on the Draft Environmental Impact Statement, which is this big book. My name is Tim Personius. I'm with the Bureau of Reclamation in Billings, Montana, and I've been asked to facilitate the public-comment portion of these.

Part of the process here is that tonight we'll be asking you if you have comments on this draft statement to give us those comments formally, and "formally" means that Carol, our court reporter, will take whatever you have to say down as a comment. It

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will be entered into the record; and in the final Environmental Impact Statement, those comments will be addressed by the team of individuals that have put this document together.

Before we get to the comment period, John Sanders, who is with the Department of Natural Resources and Conservation in Helena, is going to give a short presentation that sort of summarizes the Project up to this point. John's been working on this for a number of years and probably knows most of you and you probably know him. So he's just going to go over the high points. After that, we will probably have a question-and-answer session. We have a number of individuals here who are or were involved in drafting this document; and if there's questions or clarifications about what's in it, we can handle those and then we'd like to get into the comment period.

When you give a comment, and I will remind you of this when you get there, but you need to state your name and speak as thoroughly as you can so that Carol can get down everything you have to say. We'd also like your comments to be as specific as you can. "I don't like the document," if that's your comment, please be as specific as you can, what don't you like about it. If you are suggesting changes or

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altarnativas or somathing, please do that as well as you can.

We have a number of people here, and we ara going to try and limit commants latar to maybe 10 minutas a person so we can get tbrough everybody that wants to speak; and if we need more time than that, we can stay and you can have additional time.

We also will taka writtan comments. There's a form. Maybe wa will put thesa on tha back table and you can submit writtan commants. You can submit writtan and verbal if you'd lika. You can maybe be more spacific. You have until August 4th to submit writtan comments, and tha address is on here whare to submit them.

Wa have some extra copias of the Draft EIS if paople want to take that homa with them tonight and look at it mora in depth; and there's also an exacutive summary which hits the high points and is much shortar and easiar to read than the full document.

I think we ara just about ready. All I'm going to do tonight is try and make sure that everybody gets to speak that wants to spaak and to try and keep you focused on the Draft EIS and to get your comments racorded. I'm not raally involved in writing

the document or doing that sort of thing, but I'm here tonight to make sure you get to speak and that you get to say what you want and to make sure that we get your comments down.

So with that, I'm going to turn it over to John and he will talk about all this other stuff up here.

(Off the record for Mr. Sanders's presentation.)

MR. ALDEN: From what I'm reeding on the EIS, things are leaning toward the RCC construction; and from the diagram of the secondary spillway, that will handle the flood waters. I don't know what the dimensions are there, but it seems like that would dump over into tha Lee Homestead as it is now and you are trying to preserve that. I'd like to have comments on that. 198

MR. PERSONIUS: So your comment is you'd like to see the Lee Homestead praserved.

MR. ALDEN: That's immaterial to me. As I read the ESI, you are going to fence that in and preserve it, the Lee Homestead, as it is now; and this secondary spillway besically will dump over into it if you go to the RCC. So my question is, if you go with the RCC what is going to happen to the homestead? 198 CONT.

MR. SANDERS: I think we can take that as a comment and a question I can answer pretty quickly at tha same time. The Lee Homestead is right thare and the secondary spillway is proposed to be basically a little bit east of the actual structures and can be shifted further east; but what it basically looks like, you know what's down there. We're looking et shooting a spilling basin and a little bit of a training channel batwaen the buildings, and the stockyard's probably going to be history because of all the construction activity around there; but we can shift that to the best location. We won't know that or do that until our final enginaering design phase, which we're just in the procass now of hiring a consulting enginaering firm to start that final engineering design.

(Off-the-record discussion.)

MR. RICHER: In looking through the draft and tha access to tha aast side, outfitters use the east side, racreationists usa tha east side, ranchers use tha aast side. I think there's more use on the east side than maybe people realize. Not having access to that east side which is accessible to those people will be somewhat of en impact and definitely to the ranchers that use it to move their cattle, 199

definitely to people that own private land, to hunters, to the outfitters which use that for income. 199 CONT.
I think, and I commented in writing on this, but I think you need to take a serious look at mitigation of that in the final EIS.

MR. SANDERS: So noted. Thanks, J.T.

(Off-the-record discussion.)

MR. PERSONIUS: The forms for written comments are on the back table if you want to take some of those; and if you haven't read the document or don't have a copy, we can give you one of those or the summary. We will probably be milling around here for a little bit, too, if you want to talk to somebody individually about any other things you've got on your mind. Other then that, thanks for coming.

* * * * * * * * * * *

I further certify that the hearing concluded at 7:30 p.m. and that the above-indicatad remarks were made and that they are true and correct.

Carol Hendrickson
Carol Hendrickson
Registered Professional Reporter

STATE OF MONTANA)
)
COUNTY OF LEWIS & CLARK)

Subscribed and sworn to before me on the 2nd day of August, 1995.

Carol C. Hendrickson
Carol Hendrickson
Notary Public in and for the
State of Montana
My Commission Expires 2/9/98

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Date: 7.19.95

PLEASE PRINT Name	PLEASE PRINT Representing	PLEASE PRINT Mailing Address
Larry Alden	Cabin Owner	830 So Thurmond Sheridan, Wy 82801
Lorell GRADIN (Gillis)	" "	953 Big Horn Ave Sheridan
[illegible] Gillis & Marcia	Land owner	400 Wolf Creek Road Wolf WY 82844
Jim + Jean Muller	Landowner	Box 422 Dayton Wy. 82836
Rudy Wick	SCC	924 Burton St Sheridan WY 82801
Lyle Randen	"	Decker, Mont.
Phil Stewart	MDFW&P	Box 1630 Miles City MT 59301
J T Richer (Richer)	Cabin Owner	1996 Coffeen Sher, WY 82801
John Duncan	Decker Coal Co	P.O. BOX 12, Decker, MT 59025
Jim Hyppa (Hyppa)	MT FWP	Box 1630, Miles City 59301
[illegible]	Montana Corp	Box 595 Brinley 59016
Bill & Judy Musgrave	Land Owner	Box 32 Decker, MT 59025
[illegible]		1115 Flathead Rd Helena, MT 59601
DICK TAlley	MSE-HKM Inc	Box 7010 Sheridan Wyo 82801
Tom Crump	WWC	Sheridan, Wyo
Russell Lundgren	DKMC	P.O Box 52 Lame Deer, MT 59043
Richard & Lydia Carr (Carr)	Landowner	452 Upper Prairie Dog Banner, Wy 82832
John L. [illegible]	MDFW&P	Box 1630 Miles City, MT 59301
Pat Blair	Billings Gazette	1413 Ridgeway Ave, Sheridan, WY 82801

TONGUE RIVER BASIN PROJECT

MT Department of Natural Resources and Conservation

Northern Cheyenne Tribe

United States Bureau of Reclamation

Public Hearings to receive comments on the Draft Environmental Impact Statement to evaluate the environmental effects of the Tongue River Basin Project in Southeastern Montana.)

TRANSCRIPT OF PROCEEDINGS

BE IT REMEMBERED, that a public hearing in the above matter was held at the Miles City Community College, Miles City, Montana, on the 20th day of July, 1995, beginning at the hour of 5:30 p.m. before Carol Hendrickson, Registered Professional Reporter, Notary Public.

* * * * * * * * * * *

HENDRICKSON COURT REPORTING
Helena, Montana (406)443-0080

1

A P P E A R A N C E S

FACILITATOR:

TIM PERSONIUS
Bureau of Reclamation
Billings, MT

REPRESENTING MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION:

EDWARD M. PETTIT
Environmental Coordinator
Helena, MT

JOHN SANDERS
Field Engineer
Helena, MT

REPRESENTING UNITED STATES BUREAU OF RECLAMATION:

MARK ALBERS
TRB Project Coordinator
Billings, MT

REPRESENTING THE NORTHERN CHEYENNE TRIBE:

ERNIE ROBINSON
TRB Project Coordinator
Lame Deer, MT

REPRESENTING MORRISON-MAIERLE-CSSA:

MICHAEL A. FILLINGER
President, MME
Helena, MT

REPRESENTING DEPARTMENT OF ENVIRONMENTAL QUALITY:

NANCY JOHNSON, Helena
KEVIN HART, Helena
DAN VICHOREK, Helena

REPRESENTING FISH, WILDLIFE & PARKS, MILES CITY:

PHIL STEWART
DON HYYPPA
JOHN LITTLE

HENDRICKSON COURT REPORTING
Helena, Montana (406)443-0080

2

AFFIDAVIT

I, Carol Hendrickson, Registered Professional Reporter in and for the State of Montana, hereby certify to the following facts, to wit:

That on the 20th day of July, 1995, at 5:30 p.m., I appeared at the Miles City Community College, Miles City, Montana, for the purpose of reporting the above-referenced public hearing;

That in attendance for the taking of the hearing were the people listed on the preceding Appearance page and nine (9) other people listed on the sign-in sheet retained by Mr. Pettit, a copy of which is attached;

That myself and the people in attendance stayed at the hearing site for two hours and the following comments were made on the record, to wit:

* * * * * * * * * * *

MR. PERSONIUS: Thank you for coming. In case you're not aware, you're at the public meeting for the Tongue River Draft Environmental Impact Statement, Tongue River Project. That's this blue book over here. The reason that we are here tonight is to take your comments on this draft document. There was a meeting here apparently a while back, over a year or more ago, called a public scoping meeting; and tonight we are following up sort of the information taken then and work that's been done since then, and we are going to work very hard to explain what's been done and then to take your comments on the project.

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My name is Tim Personius. I'm with the Bureau of Reclamation in Billings, and my job is to facilitate the meeting and make sure that your comments are taken and heard. We have a court reporter, Carol Hendrickson. When we get to the comment phase, she will be taking your comments and they will be answered in a final version of the Environmental Impact Statement. Comments that are given here tonight will be in there and they will be answered. So it's important if you have things to say that you do so tonight.

You may also make comments in writing. We have some forms around here, I think; and when you leave, you can take one or you can simply write a letter. We will put some out over here. You have until August 4 to mail in written comments; and you may also give oral comments tonight and write in more comments later. There is no limit on that.

We do have some time constraint tonight when we take comments, and I want to make sure that everyone who has something to say gets a chance to say it. So I may have to cut somebody off if you've got more than an hour or so of comments to make, but I'm sure we will have plenty of time for that.

When we get to the comment phase a little

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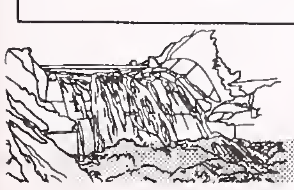

later, it's going to be important that you tell us that you are making a comment because Carol is going to take your comment verbatim. So you have to tell her your name and that you are going to make a comment and she will take that. If you just have a question, just say, "I've got a question"; and we have John Sanders and several other people here tonight who have participated in putting this document together, and hopefully they can answer your questions or if you have something you just want clarified or want to know how they came up with some number or map or whatever. So we will remind you of that later.

I think we are going to start out tonight with John Sanders, who is with DNRC, and I think most of you probably know him. He's been working on the project for a number of years. He's going to give an overview of the project and get us familiar with where we are now, why we are here, and then we will lead into a question-and-answer session when he's done.

That's about all I have to say right now. When we get to the comment phase, I will try to remind you, again, please be as specific as you can when you have a comment. If you don't like something or you do like something, please try and say why as best you can, why you don't like something, why you do like

something; or if you have a suggestion on how something should being done differently, please try and make that as specific as you can.

With that, I will turn it over to John.

MR. SANDERS: Thanks, Tim. First, I'd like to thank those of you who are here for coming here and make some additional introductions above and beyond the ones Tim made. Tim mentioned that we have some members of the team who actually helped or contributed to producing the Draft Environmental Impact Statement on the Tongue River Basin Project. With me from Department of Natural Resources is Ned Pettit, Environmental Coordinator on the Project. With Tim from the Bureau of Reclamation is Mark Albers. He was here back in March of '93, when we scoped the EIS here. Mark's kind of Ned's counterpart, making sure we are complying with the National Environmental Policy Act and other duties as assigned on the Tongue River Basin Project, Bureau of Reclamation.

Another guy who was with us here in March of '93 when we scoped is Mike Fillinger. Mike works for Morrison-Meierle Environmental. They are the contractor who, with their team of experts, produced the document that we are here taking comments on

tonight.

We worked real closely with Department of Fish, Wildlife and Parks in coming up with some of the analyses that are in there and dealing with some potential impacts to parks and fisheries and related issues, so we have a little backup here from people you probably already know. Don Hyyppa, John Little and Phil Stewart, all from the Region 7 office here in Miles City, are here with us tonight. So I'd like to thank them for coming, again.

I'd like to give you a brief overview of what the Tongue River Basin Project is. We are not saying Tongue River Dam Project anymore because as a broader project, it still includes repair and enlargement of the Tongue River Dam, but also includes the partial fulfillment of the Northern Cheyenne reserved water rights settlement; and in addition to that, we are looking for projects to conserve, develop, protect, or enhance fish and wildlife habitats in the entire basin. For those reasons, it's now termed the Tongue River Basin Project. That fish and wildlife enhancement can occur anywhere in the Tongue River drainage, all the way from the Wyoming border to here in Miles City, including all the tributaries of the Tongue.

The purpose of the project hasn't changed much since we scoped here two-and-a-half years or so ago. As you all are aware, and in some cases maybe painfully aware, we've got an unsafe spillway at Tongue River Dam. So foremost in the list of purposes for the project is to take care of the safety problems there at the dam and protect downstream lives and property by building a newer, safer spillway.

We want to protect all the contracts, existing contracts in the Tongue River reservoir. That would be the 32,500 that the water users have contracts for plus the 7,500 acre-foot contract the Northern Cheyenne Tribe has. Then through a combination of additional storage water and exchange water, provide up to an additional 20,000 acre-feet for the Tribe and again enhance fish and wildlife resources in the basin.

Need for the project includes all the goals which are components of the Water Settlement Act, and that Reserved Water Rights Settlement Act of '92 ratified the compact that the State and the Northern Cheyenne negotiated and signed on June 11th, 1991. The project is needed because the Tongue River Dam is currently unsafe and downstream lives and property are at risk. It's needed because the compact and the Act

direct ns to provide thet additional 20,000 acre-feet of water to the Tribe.

The United States Government, through both the Bureau of Reclamation, who is represented here, and through the Bureau of Indian Affairs, has trust rasponsibilities to the Northarn Cheyenne Tribe. Any Indien trust assets held by the Tribe have to be protected by the government; and then, again, just due to natural forces and human involvement in tha basin, fish and wildlife resources and habitats have suffered and we have tha enhancement portion of the project to try and alleviate some of that concern.

I'm sure most everyone or everyone here knows who is proposing the project. It's a thrae-way partnership that's probably pretty unusual in terms of water projects because we heve the United States government, the Northern Cheyenne Tribe, es a sovereign nation participating in the project, end then the State of Montane through the Department of Natural Resourcas as the ownar of the dam, itself.

Tim indiceted thet we are here tonight to taka comments on e Draft Environmsntal Impact Statement, so we wantad to include a little bit of information about what en EIS is. It's a comprehensive report required by both faderal and

state lews. We are producing this Dreft EIS to comply with the National Environmentel Policy Act, or NEPA, end the Montena Environmantel Policy Act, or MEPA. That raport has to address how a proposed project, in this case Tongue River Basin Project, will affect the existing environment. Typically those evaluations of impacts are the natural and physical environment, economy, social impacts, cultural resources, the recreation base around the resarvoir and downstream.

An EIS is typically prepared in two phases. We are in the draft EIS phase now, which describes the proposed action, identifies alternatives end then analyzes the impacts of the proposed action to the environment. Anyone who is interested during either the question-end-answer period or after the hearing is over, we do hava e flow chart that shows the generel flow of the process for an anvironmentel impact stetement. When we were here in March of '93, we were in this sheded box, "Public Scoping." We prepered a dreft, circulated it to EPA and the public, and we are down here now receiving public comments in these hearings.

The second phase of an environmental impect statement tekes the comments that we would receive at a hearing like this or written ones that may coma in

up until August 4th, presents thosa comments on the draft and the project sponsors' responses and any updated information and analysis that ends up being required as a result of those comments.

Now, I mentioned in the first phase of the EIS ona of the components of that is to idsntify alternetives to a proposed action; and when we were involved in tha scoping process, we wara looking for idaes or suggastions from the public as to alternatives to put together a safe dam at Tongue River Dam and provide that additional water to the Northern Cheyenne. At the time we wera scoping the Draft Environmental Impact Statement, we had just completed a special study report that analyzed two major alternativas, the first ona being a labyrinth weir, which at the time that wa had the scoping meatings we thought was probably the prefarred altarnativa. This zigzag shape hare is tha weir crest, itself, end that accordian, zigzag shape is what gives it its name, a labyrinth. Thera would be a massive structural concrate spillway right here where the existing spillwey is now with the weir crest, the chuta and the new stilling basin. This alternetive would include rehabilitetive or even realigned low-level outlet works and en auxiliary outlet works

to be used during construction end then to be used again any time that the main outlet works is shut down for inspection. This elternativa end the other one we are talking about now, as well, both include the fish and wildlife enhancemant aspects of tha Tongue Rivar Basin Project.

Through tha anelyses end the praparation of the Draft Environmental Impact Statemant, we discovered, I guess is one way of putting it, we discovered that we needed to bring the second alternative that we hed looked et in the past np to the same laval of angineering, preliminary engineering design as the lebyrinth had been. That second alternative that we talked a little bit about during scoping was the roller-compactsd concreta, or RCC.

Under elternative two, we would still likely have a primary structural concrete spillway here at the same location of the existing spillwey, rehabilitated low-level outlet works as required undar the preferred alternative of en auxiliary outlet works; but in addition to that, very nearly all of tha existing dam embankment would ba capped with roller-compacted concrete, likaly with a secondary spillway at an elevation a little bit highar than this crest and an emergency spillway that cappad the rest

of the embankment. Through the analyses that went into the roller-compacted concrete alternative as we were preparing the Environmental Impact Statement, we ended up designating this as the preferred alternative in the Draft EIS, and that basically means it's the environmentally preferred alternative at this time.

The environmental policy acts that we are complying with also require that you analyze the alternative of doing nothing, the no-action alternative. Under that alternative we wouldn't fix the dam, we wouldn't provide the water, we wouldn't do the fish and wildlife enhancement, we wouldn't fix the county road or move it or relocate campgrounds. We would just not do anything. That alternative meets none of the goals or the need or the purpose of the project.

Just quickly to put together a couple of schedules here, I mentioned that we had the scoping for this Environmental Impact Statement in March of '93. It was the 5th of June when we made the draft document of '95. When we made the draft document available to the public, that started a 60-day comment period which ends August 4th; and we will accept written comments that are postmarked by August 4th if somebody wants to make a written comment later on.

This week we are having eight public hearings in the project area. This is the seventh one that we have had so far this week. We will have one more hearing tomorrow evening in Billings. We are doing the hearings, as Tim indicated, to receive comments, hopefully specific comments on the draft document itself. Once we have those comments in, have analyzed them and come up with the sponsors' responses to those comments, we hope in December of '95 to have a final EIS on the streets.

The rest of the project schedule, if we get a final EIS out December of '95, we would anticipate a record of decision, which is a formal federal notice that would indicate the project sponsors' agreed-upon course of action. We would anticipate having that record of decision in February of '96, finishing preliminary engineering design on some aspects of the project and actually having the county-road-relocation portion of the engineering done so that late summer, early fall of '96 we could do the road construction that's going to be required and then actually begin dam rehabilitation in construction season or as early as we can in '97, be under construction for two construction seasons and close out maybe as late as October of 1999.

200 MR. HALBERT: You said you hoped to start construction in early '97 and go through two construction seasons?

MR. SANDERS: '97 and '98.

MR. HALBERT: And end in October of '99?

MR. SANDERS: Final, making sure everything is done and wouldn't be doing any actual major construction in '99, but we wouldn't close the project out until we were convinced everything was done to spec, and that could be as late as October '99; but the actual spillway construction should be finished in '98, so we could store water in the runoff season of '99, additional water.

John's pretty much on cue for starting the questions and answers. If there are questions or then, as Tim mentioned, if you've got a comment, two ways to comment on the Draft Environmental Impact Statement. Again, make a comment for the formal record here tonight for Carol to record, or drop something in the mail to Ned by the 4th of August.

With that, the way we worked it last night, Tim kind of opened things up for questions and comments at the same time. If you've got a question, make sure it's clear to us that it's just a question that we can kind of discuss or I can try and answer or

someone else can. If you have a specific comment on the EIS, tell Carol that it's a formal comment that you want in the record and we can kind of work back and forth doing questions and answers and comments both at the same time. Tim, I think you were supposed to have said that.

MR. PERSONIUS: You are doing a great job. Just please remember if you are going to make a comment, give Carol your name when you start.

MR. SANDERS: Any general questions? Any specific comments on the Draft EIS? Any comments on the weather?

MR. MONGOLD: Being an irrigator along the river, I couldn't get it from that EIS statement
201 if, like, it sounded like with this proposed preferred alternative that we would have irrigation water that wouldn't be limited during the construction phase and the water to river wouldn't run wild as it was going to in other alternatives.

(Off-the-record discussion.)

201 CONT. MR. MONGOLD: Are you going to be able to maintain some sort of flow that irrigators can use?

MR. SANDERS: We don't pass water through. What we have under typical or normal operations now is a tunnel -- I guess it's the same

tunnel in either alternative -- that passes water underneath, basically underneath the spillway, and it exits partway down the spillway chute. Now, we do need to either reconstruct, rehabilitate or realign that tunnel, so there will be some time during the construction, two construction seasons that the primary outlet works is out of service. Under either of these alternatives we have proposed to put in an auxiliary outlet works and to construct that auxiliary tunnel first so that we, while we are working on whatever repair or rehabilitation we do to the existing tunnel, we would be passing flows through an auxiliary outlet works. 202

MR. MONGOLD: Where is that supposed to be? 202 CONT.

MR. SANDERS: Under the labyrinth weir alternative, it's proposed to parallel, on the other side, just to parallel the spillway chute. We have not designated a specific area where it will go under the RCC alternative. We have looked at putting it over here through the embankment, itself, in the area of the old river channel, the original river channel; and it could conceivably go somewhere else along in the embankment. So we would have that auxiliary outlet works to pass water around the project during

construction, and it would stay in place so that every year when we have to shut down the main outlet works for inspection and potential repairs, we would not have to dewater the river even at those times. We could have water running through the auxiliary outlet works.

UNIDENTIFIED PERSON: What would be your idea of how the amount of water discharged from there might be controlled from the standpoint of irrigators' needs in that respect? 203

MR. SANDERS: The compact requires a five-person committee to put together an annual operation plan. That includes a representative from you guys, from the State, federal government, Northern Cheyenne Tribe and a fourth member to be named or agreed on, or the fifth to be agreed on by the other four. So as far as annual operations, it's anticipated that will be done by that five-member committee, and it will be done based on an annual plan. Any differences in what would be normal releases for the water users' irrigation would depend on how and when the Tribe would use their water. If they end up putting in some additional irrigation systems and using some for irrigation, it would be released during the irrigation season. If they lease

some to Fish, Wildlife and Parks for instream flows, that would change some of the spring spawning flows or if they leased it to augment winter flows to keep more water in the river during the winter, there could be some differences in operation based on how the Tribe uses their additional water.

MR. HUGO MUGGLI: Would that require that an irrigator would have to order water and then some individual would turn the water on for you so you could use it and you would have to specify the amount of water that you were talking about; and then when you had gotten that much water, they'd shut your water off? 204

MR. SANDERS: Do you think it will get to that point, Art, get that complicated that we've got --

MR. HAYES: I think under the compact the water users still operate the dam, and I don't think we can see any foreseeable -- I can't see any forseeable trouble. I don't see us even putting on a ditch rider or anything at this point. I think we are going to have plenty of water. I don't believe the 20,000 acre-feet of water additional storage is going to -- it's got to go through there sometime, whether it's solely used for instream flows or what; but I 205

actually think it's going to be more beneficial to the water users at this point. 206

MR. HUGO MUGGLI: The reason I'm concerned, I was here when the original dam was built and the plan for the distribution of the water was set up, and that resulted, the plan that they used resulted in total dissatisfaction with the system and very poor service to the people that were using the water; and that continued for several years, and it resulted in the water users just ignoring the authority to order that water. The reason that it did not work was that they took the attitude that each individual would have to order his water, and then the dam would turn it loose and there was no supervision over the water and no provision made for evaporation or loss in that respect; and normally the water that he ordered never showed up if you were down on the lower end of the project.

That went on for several years, and then the Congress made a provision that these projects of this nature would be liquidated; and in that process, the Reconstruction Finance Corporation represented the government and held bonds and they came, they had a man by the name of Mr. Buzzard that came here and was insistent that the T & Y Irrigation Project buy that

dam. My father and John Herzog and Amal Praul were the three commissioners on the T & Y Irrigation Project, and Mr. Buzzard had indicated to tham that they did not have any choice ahout it, thay had to buy it hacausa the irrigation district had a loan from Reconstruction Finance Corporation and their payment was up to date and all of thosa things ware in ordar. He says, "If we need to, we will pressure you as far as your loan is concerned."

Wall, that seemad like kind of an overhearing way to handle the thing. What finally transpirad was that the three commissioners told Mr. Buzzard to take those honds over to the hank and they'd ha over there in the morning and they wonld take the whole works, take the bonds; not the dam, just the honds. Well, apparently he thought they couldn't do it, that they couldn't pnt up that kind of a thing. So the next morning he went to Mr. Jones at the bank and asked him if he thought thosa fellows could handle that, and Mr. Jones told him, he says, "Any one of them could buy all of those bonds in one lick," so then he backad off.

Then he had hean in contact with the State engineer on the operation of this project and all of the details that were going on, and ha came to my dad

one day, Mr. Buzzard did, and ha asked him how he thought this projact could be handled. At any rate, my father told him, he said that in order for this thing to work out, if the dam is operated to attempt to maintain stream flow, not that they were compelled to or that thay were held liable if they did not do that, but if they would attempt to maintain the stream flow and then at tha point in tima that water was in high demands, they would contact T & Y Irrigation District hecanse they are the last persons on the line, and they in turn would ask for mora watar to be released; and when the emergency was over with, then thay'd cut the flow back down. That has been in action that way avar since that tima.

MR. SANDERS: Is that when they finally started actually filling the rasarvoir? The first few years they didn't even fill the reservoir, did they, clear full, anyway?

MR. HUGO MUGGLI: According to the original program for that reservoir, there was a provision that said that they were to do their storing outsida of the irrigating season; and how that was handlad, I'm not sure. I think that tha State engineer instructed the dam tender on what was what. So at any rate, looking back at it, as soon as thay

did that in that form, the actual amount of water that they releasad during the irrigating season did not increase. It purely and simply providad that when someone got ready to irrigata, he went ahead and irrigated.

MR. SANDERS: That's how it's baen working ever sinca.

MR. HUGO MUGGLI: It's worked that way; and the only time that I can say that there wae a problem with that wae last year, and apparently that was a conflict between the Fish and Gama and the operation of the dam. In tha spring, they discharged the water and draw the dam way down; and than they thought they had enongh flow coming in so they could bnild it back np, and that didn't happen. So that, of conrse --

MR. SANDERS: It happened this year, though. Wa thought wa had a lot of snow this year, and we wera right.

MR. HUGO MUGGLI: That's corract.

MR. SANDERS: I appreciate that history and, Nad, that may lead us into taking a look at the comment or looking to eee if there ien't lying in there somawhere a comment regarding oparation, future operation of tha reservoir.

MR. MONGOLD: I have a question on that, and my question was in that EIS statement there, it said that they were going to possibly hava, like, a ditch ridar or somebody that was going to look -- I forget the wording of it exactly.

MR. SANDERS: So do I. During construction was when wa looked at that.

MR. MONGOLD: In case the water wasn't getting down to the T & Y ditch, that they might hava to get a water commissioner. My question would be, who would pay for that and what authority would they have? Would they be, like, the sheriff, and who is paying him and that sort of thing?

207

MR. SANDERS: What I was going to say wae anything related to construction is likely going to he a project cost that would come out of the project hudget. How tha authority would he worked or whatever, if it's actually a water commissioner, there'e a percentage of the water users that actually have to ask for it, right?

MR. ROGER MUGGLI: Not a percentage. It's someone with a prior right that is not being fulfilled.

MR. SANDERS: In this case, probably T & Y.

MR. ROGER MUGGLI: Well, usually -- Whenever it has been done, that was the case; and that is an action of the Court. They go to the Judge and ask for an appointment of a commissioner and that commissioner is responsible to the Judge for all of his actions and so forth.

MR. SANDERS: T & Y is 187-and-a-half cfs, is that right; and it's the second decreed right on the river. So in taking a look at preparing the Environmental Impact Statement, if we end up in a low water-flow year during construction and we are not able to store the water that we hope we can behind the coffer dams, if we have like a run of river, you know, whatever comes into the reservoir gets released from the reservoir and there's only enough there or just a little bit more, for instance, than it would take to satisfy the T & Y right, it might require a commissioner to make sure that that run of river flow got to the T & Y diversion because of the priority; and who's got the first right on the river? It's much smaller than T & Y.

MR. ROGER MUGGLI: Mark Nance.

MR. SANDERS: Mark Nance, that's right; but it's a, what is it, an 8 or 10 cfs? Basically it's a small right. So in order to keep the river and

fishery and basically just keep the river alive, at least as far as from the dam to T & Y, if necessary, we've provided the option to put a commissioner on to see that the water would get to T & Y.

UNIDENTIFIED PERSON: That question came up this last year. We had a T & Y ditch meeting and the water wasn't getting down to us last year and there didn't seem to be any provisions or nobody knew what to do about it, you know, like the people up river were pumping water like mad and they had all the water in the world, but the T & Y didn't. So it was kind of a question of who has the authority to take care of it. 207 CONT.

MR. SANDERS: I don't have an answer to that. Roger?

MR. ROGER MUGGLI: My comment to that is I pretty much watch the situation in our canal and that judgment, I try to call that shot as to when I know the folks on the T & Y are going to be using the water heavy; and if I see a shortage in the river, in other words, no water going over our dam, and I know that the heavy irrigation time is going to start, like, after the first cutting, then I will call Art and tell him that we need more water to try to anticipate that five days or whatever it takes to get

down there. I don't have any big problem with doing that at all. I'm pretty satisfied; and the number of years I have done it, I'm fairly comfortable with it and we have been from time to time faced with some temporary shortages and I try to keep everybody calm and assure them that this will pass and water will get here and I'm in no better position than they are given the fact that our 9700 acres, our farm is comprised of almost 1600 acres in that system, so I have a lot on the line as well as everyone else.

So we try to run that system as frugally as we can in regard to amount of water that comes in. I don't like to jump the gun and ask for too much water or complain too heavily in the fact that later on, in August, we might be faced with a shortage. My real hope is that if we can run it essentially the same way, I have no problem with doing that; but my good feeling in the whole thing is if I know there's another 20,000 acre-feet or much larger storage capacity in there, that if I can anticipate or see a low time in the river and it's going to run up against our need for water, that I can call Art and he does what he can based on his information as to the condition of the level in the dam, will turn that loose, or whomever he talks to, and we get it resolved 208

and it's worked quite well.

MR. SANDERS: You've got a supplemental contract for water in addition to your own water right, too; right?

MR. PERSONIUS: I'm not sure if we are still commenting on the EIS. Is this an issue or not, John, because I'm not expert on what's in there?

MR. MONGOLD: It's in there.

MR. PERSONIUS: If that's the case, would you guys like to make comments on what you are talking about, recommendations, what's in here that addresses this, what should be in here to address it or shouldn't be? Can we focus on that?

MR. ROGER MUGGLI: I'd like to comment. My name is Roger Muggli of T & Y; and as I see it, what I've read insofar as the section in regard to the construction period of the dam and the delivery of water out of that system, I can live with that. I'm speaking for the T & Y. 209

MR. SANDERS: Thanks, Roger. Formal comment, Art, or a question?

MR. HAYES: General comment for the Tongue River Water Users. 210 My name is Art Hayes, Jr. I'm president of the Water Users' Association. The Board of Directors, to be truthful, none of us have

had time to really go through the document with a fine-tooth comb, so we will probably have written comments come in later; but what we have found is, I've got about eight or nine things here.

The first thing, we thought the EIS was very
210 CONT. general and needed to have more things down specifically and better things. Our biggest problem is maybe we don't understand the engineering of the labyrinth weir or the RCC spillway, but we could not find anywhere in the two designs where we have some long-term maintenance costs. It was not analyzed in
211 either one. We want that. We want to see what the maintenance cost is going to be on both of them. I mean, it might cost $10 million more for the labyrinth weir right now, but we don't want to have to pick up that tab if the RCC starts falling apart.

Another question I have is we are all kind of vague on the drawings on the RCC. This is a little more plain, but we were wondering why the RCC spillway
212 could not be moved to the far east side of the dam, right over the old river channel, a coffer dam thrown across the corner of the dam there; and we could store more water during construction of the emergency spillway and we could almost run at full pool while that spillway was constructed. And then once that

212 CONT. spillway is constructed, then put the coffer dam in front of the other one and raise it four feet. I asked Glen McDonald that question and he said they didn't want to put cement over the fill material because it would settle, but it looks like it's on the fill material now.

MR. SANDERS: I shouldn't interrupt if you're making a formal comment.

MR. HAYES: Go ahead and interrupt.

MR. SANDERS: Everything that's on the fill material shown here, that's all roller-compacted concrete. This area that's shaded here isn't structural concrete. It's just at a different elevation.

MR. HAYES: I realize that. We were
212 CONT. wondering why that part couldn't be moved over to the east side and constructed first.

MR. PERSONIUS: And your comment is that you are recommending it be moved?

MR. HAYES: Yes. We are not even sure --
211 CONT. We have not come up with a decision which one we prefer, but we would like mainly to see some long-term maintenance costs because I believe under the compact we will, as water users, still be maintaining the dam as present and we want that addressed.

On the riprap, it looks like quite an
213 expensive thing for your road and the mine. We would recommend that you take a very serious look at getting it on the dam site or somewhere close to the dam rather than hauling it into Sheridan on railroad cars. Looks to me like it would be a horrible expense. I don't know if there's any figures on that in it or not, John. We couldn't find it anywhere, the cost of that.

MR. SANDERS: It's somewhere. If it's not in the Draft EIS, it's in the mitigation study.

MR. HAYES: We also had a question on who
214 would pay for a water commissioner, whether that would be paid for by the water users or would that come out of the project costs or whatever, and I think you have kind of answered that.

We couldn't find anywhere in there where, having it be a new dam, where the increase, and we are sure we are going to see an increase in recreation,
215 where that was accounted for in there. We would like to kind of realize how much more recreation is going to go on at the dam, what more restrictions might have to be put on up there or whether or not, you know, whether some time in the future a minimum pool is supposed to be left in the dam for recreation during

215 CONT. the summer. We'd like some answers on that, too.

Fencing the reservoir, we'd like to know how
216 much is going to be fenced. Some of the landowners have called me. They would like to know how much is going to be fenced, why it's going to be fenced; and reading the Environmental Impact Statement, it said for wildlife mitigation. I'm sure parts of the reservoir being fenced might help that; but when you've got 4,000 people in there, you are not going to have any wildlife in a fenced-in area. I'm sorry.

I know I've had numerous complaints from people, too, being chairmen of the Water Users', that when they are camping there they have to step in cow pies. I don't know why -- They just say, "We are tired of walking in the cow pies. Let's fence this off." If it is fenced, we would like to also see that those landowners are compensated in that wells are drilled or something so their livestock can get water.

The wildlife enhancement money, we really don't know what to think about that. It appears to us
217 right now that we have three agencies in kind of a pulling match to see who gets the greatest amount of money. We think we lose 275 acres of wildlife habitat that has to be replaced or bought or mitigated or

something. We can't see where buying land is going to create more wildlife habitat because if you are going to lose it, you are going to lose it. They don't make anymore land, anyway. 217 CONT.

We would like to see something concrete in those proposals. They are very vague, very broad, no costs, no nothing attached to them; and as far as redoing the prairie dogs and stocking buffalo, we really have some legal questions on putting buffalo on the Cheyenna Indian Reservation and stocking their reservation with buffalo for a private entity. 218

MR. SANDERS: Can I interrupt just long enough to clarify something. When you say something more concrete in those proposals, you mean the enhancement proposals?

MR. HAYES: We would like to see cost figures, where it's going to happen and why. 218 CONT.

MR. SANDERS: And you don't mean concrete, like the concrete spill.

MR. HAYES: No. That's about all the comments we have at this time, but we will probably be submitting more in writing when we get better time to write it.

MR. PERSONIUS: Thanks, Art. Are any of the people that are working on the document, did any

of you not understand any of the comments? I'm not asking you to answer them, but did you not understand because I didn't understand the one on recreation.

MR. SANDERS: Increased recreation?

MR. HAYES: Increased. When you have a new facility, you are upgrading your campgrounds and you are going to have more and more people. We would like to know how that is going to affect the operation of the reservoir, how it's going to -- what are you going to do to compensate for more people coming down? 215 CONT.

MR. SANDERS: Good comments; all but one, but I forget which one. Just kidding.

MR. MUGGLI: I have one other comment in regard to the construction of it; and like Art, too, I haven't had a chance to read the majority of this, just picked a few things. Why does the spillway have to have such a massive capacity; and if that was made much smaller, would it be a lot cheaper? When you stop and think the volume that that is supposed to handle, that's almost twice of what the flow in the Yellowstone is right now, unless I read that wrong. Where is the importance of that? That seems ridiculously high to me, to have that spillway at that capacity. 219

MR. SANDERS: You said you had a comment, and the comment is the spillway design flood seems high to you by way of a comment.

MR. MUGGLI: Yes.

MR. SANDERS: If that's a fairly accurate representation of your comment, then I'll treat the rest of it as a question and try and give you a short version of a long answer.

(Off-the-record discussion.)

MR. MUGGLI: I guess I have a hard time believing we need a spillway of that magnitude to accommodate that amount of water. It seems bizarre to me, but I wouldn't know how much less it would cost if you made it -- A little or a lot of those costs are fixed; and slope angles and all that, which probably wouldn't be significant if the cost decreased, but nonetheless, it seems to be an overkill. 219 CONT.

MR. SANDERS: But be aware it is considerably less than the probable maximum flood that is now sort of the criteria that the Dam Safety Act looks at.

MR. HAYES: John, I don't know if I have a comment or just a question, and I guess that makes it difficult for you.

MR. SANDERS: Well, we'll record it and

decide.

UNIDENTIFIED PERSON: Okay. Since the Tongue River Water Users are really concerned about maintenance and that being our top priority, is it possible to do your secondary spillway out of a better material than your roller-compacted concrete and thus in the long run reducing maintenance costs but still achieving that design; and I think we need a cost comparison on the two and a cost comparison between a scorio aggregate and a good aggregate. 220

MR. SANDERS: Let's treat that as a comment that basically says you feel we should do some additional preliminary engineering or, during our final engineering design, if this turns out to be the preferred engineering alternative, that looks at a little bit better material for the secondary spillway and compares the differences between the aggregate sources or types and then compares maintenance between those two.

MR. HAYES: Yeah, and that would give us a good indication of what our maintenance costs may be. 220 CONT.

MR. HUGO MUGGLI: The cost of the original dam, the contract was for less than one million dollars. Now, when you back that off against 221

221 CONT.

what they are talking cost now, it looks like a preposterous figure.

MR. SANDERS: Let's tie off that as a comment, first, before I start nattering on, thinking I'm answering a question. Basically your comment is just to the fact that the proposed costs for the spillway are tremendously high in relation to what the original dam cost to construct.

(Off-the-record discussion.)

222

MR. HIRSCH: If you use the roller-compacted concrete design and the cost of the project is reduced by some $10 million, will the water users' share of the construction cost be less than the anticipated $5 million that was initially thought to be the case?

MR. SANDERS: That's a good question and comment.

(Off-the-record discussion.)

223

MR. HUGO MUGGLI: The Cheyenne Indian Reservation was established by a proclamation of the President, whereas the Crow Indian Reservation was established by a treaty with the Indians. He made the statement that in the process of the President declaring that a reservation or establishing that reservation, that gave each one of those Indians

223 CONT.

automatic citizenship and they, therefore, enjoyed the same rights as any other citizen. They could file on water or develop water under the laws, and there was really no necessity of making a special issue out of that part of it.

MR. SANDERS: But we did, anyway, by entering into the Compact in '91.

223 CONT.

MR. HUGO MUGGLI: That's right, but that doesn't make the Compact right.

(Off-the-record discussion.)

224

MS. AXT: Cindy Axt, Miles City. At the very beginning of the seminar you had mentioned two construction seasons. Just looking at '97 to '99, you can quickly figure that it would be three years, and I just think it would be better to tell people up front we are basically looking at three years rather than just say two construction seasons because you are looking at '97, '98 and '99, but you are not considering closing the project until October of '99. As an irrigator, I'm basically looking at three irrigation seasons, possibly four, depending upon what happens to the storage in '99 for the following year. I guess I'd rather than have you mislead people saying it's just two construction seasons, it's really not. It's three.

MR. SANDERS: We'll note that as a comment.

(Off-the-record discussion.)

225

MS. AXT: I haven't read this whole thing, either, but it just seems like there's always new developments that keep popping up. I'm looking at Chapter 2, point 17, on page 40 of Chapter 2. I have a pretty big problem with that. It's talking about the prairie dog reestablishment. I guess I'd like to say I'd like to put in my application tonight for restoring those prairie dogs. I have a plan. I believe there's a giant vacuum cleaner that sucks up prairie dogs, and I would like to get ahold of that machine. I will go around and I will collect the prairie dogs --

MR. SANDERS: On your place.

225 CONT.

MS. AXT: And neighbors' and whoever else, and I'd like to sell them to the Cheyenne Reservation. There's money to be made here. I can see it right now, and I'd like to apply for the job. But if they want prairie dogs, heaven forbid that they should pay a thousand bucks apiece for somebody to go and capture them in Canada and transplant them here in Montana.

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The buffalo is the second item on the list.

226 CONT.

This is wide open with the problems that we've got with Yellowstone National Park, brucellosis and they are not staying within the Park boundaries. This is just an open can of worms. Bison; how many? Who is paying for them? I suppose we are, indirectly. Will someone put me up into the bison ranch? I'd love to. Give me the money. Hey, I know, I'll raise buffalo, too. Of course, we all know the problems that it leads to. Who is going to manage them? Are they going to be contained on the Reservation? Are we going to be sitting like the ranchers out west having brucellosis at our doorsteps when the bison leave the Reservation? Are they going to vaccinate?

When you talk about back in the early '80s and '90s, you are talking about dam construction; and now all of a sudden we are adding bison, and I don't understand what this has to do with the dam. I understand that they want to have some wildlife enhancement, but there's not even bison there now; and I know they'd love to turn this place into the big open again, but I have big problems with it and I am, I guess, vehemently opposed to it. And who is going to address those problems? Who is going to manage the wildlife? Who is going to go in to the Northern Cheyenne and say, "You've got to have a vaccination

program." There has to be a limit on animal units so you don't overgraze the land and they don't start looking at neighboring ranchers' hayfields and escaping and pretty soon they are on my place. 226 CONT.

MR. SANDERS: Is that the end of your comments, Cyndee?

MS. AXT: No, but I'll quit for now.

MR. SANDERS: And the only reason I ask, I don't mean to stop you, is I want to thank you for being specific as to a page number; and for the record, Carol, Cyndee is referring to the part of the proposal that deals with the wildlife enhancement proposal or proposals. Continue if you've got additional comments that you want on the record.

MS. AXT: I'll think about it. I'm not against wildlife enhancement altogether, but I am definitely opposed to prairie dogs and bison.

MR. SANDERS: We have noted that. We will address it. 226 CONT.

MS. AXT: And remember, I applied for the job on the record. I'm the first in line.

(Off-the-record discussion.)

MS. AXT: I guess I would also like to comment and say I stand behind what Art and Les also said on their concerns. I support that. You just can 227

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ditto me on all of that. 227 CONT.

MR. HUGO MUGGLI: Would it be in order to enter a written comment at this time?

MR. SANDERS: If you have one prepared now, absolutely. If you will give it to Ned, we will enter it as a written comment.

MR. HUGO MUGGLI: I reserve the right to write another one in the meantime.

MR. PERSONIUS: Yes, sir.

* * * * * * * * * *

I further certify that the hearing concluded at 7:30 p.m. and that the above-indicated remarks were made and that they are true and correct.

Carol Hendrickson

Carol Hendrickson
Registered Professional Reporter

STATE OF MONTANA)
)
COUNTY OF LEWIS & CLARK)

Subscribed and sworn to before me on the 2nd day of August, 1995.

Carol Hendrickson

Carol Hendrickson
Notary Public in and for the
State of Montana
My Commission Expires 2/9/98

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Date: 9-20-95

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PLEASE PRINT Name	PLEASE PRINT Representing	PLEASE PRINT Mailing Address
Art Hayes	FRWU	A Bar Ranch Birney Mt 59012
Blaine Muggli	[illegible]	T.R. Rt. Miles City MT 59301
Ted Hindt	TRWU	HC 32 Box 4311 Miles City Mt.
Susan Mongold	farmer	Broadus Stage MC MT 59301
Mark Elk	TRWU	HC 32 Box 4316 Miles City MT 59301
Rex Mongold	Farmer	B 57MB MC MT
Roger Muggli	Ft. [illegible]	RT1 Box 2216 Miles City
Toby Little	MDFWP	P.O. Box 1632 Miles City MT 59301
Cyndee Axt	Rancher	HC 30 Box 4941 Miles City MT 59301
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John Halbert	Miles City Star	Box 1216 Miles City 59301
Phil Stewart	MDFWP	Box 1630 M.C. MT 59301

TONGUE RIVER BASIN PROJECT

MT Department of Natural Rasources and Conservetion

Northern Cheyenne Tribe

United States Bureau of Reclamation

Public Haarings to receive comments on the Dreft Environmental Impact Stetement to evaluate the environmental affects of the Tongue River Basin Project in Southeastern Montana.)

TRANSCRIPT OF PROCEEDINGS

BE IT REMEMBERED, that a public hearing in the above matter was held at the Fireside Inn, Prospector Room, Billings, Montana, on the 21st day of July, 1995, beginning at the hour of 5:30 p.m. before Carol Hendrickson, Ragistered Professional Reporter, Notary Public.

* * * * * * * * * *

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A P P E A R A N C E S

FACILITATOR:

TIM PERSONIUS
Bureau of Reclamation
Billings, MT

REPRESENTING MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION:

EDWARD M. PETTIT, Helena
JOHN SANDERS, Helena
KEITH KERBEL, Billings

REPRESENTING UNITED STATES BUREAU OF RECLAMATION:

MARK ALBERS, Billings
KATHLEEN JABS

REPRESENTING THE NORTHERN CHEYENNE TRIBE:

ERNIE ROBINSON, Lame Deer
HUTCH SOOKTIS, Lama Deer

REPRESENTING MORRISON-MAIERLE-CSSA:

MICHAEL A. FILLINGER, Helena

REPRESENTING DEPARTMENT OF ENVIRONMENTAL QUALITY:

NANCY JOHNSON, Helena
KEVIN HART, Helena
DAN VICHOREK, Helena

REPRESENTING ENVIRONMENTAL PROTECTION AGENCY:

STEPHEN POTTS, Helena

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AFFIDAVIT

I, Carol Hendrickson, Registered Profeseional Reporter in and for the State of Montana, hereby certify to the following facts, to wit:

That on the 21st day of July, 1995, at 5:30 p.m., I appeared at the Fireside Inn, Prospector room, Billings, Montana, for the purpose of reporting the above-referenced public hearing:

That in attendance for the taking of tha hearing were the people listed on the preceding Appearance pege and eix (6) other people whose signatures are on the sign-in ehaet retained by Mr. Pettit, a copy of which is attached;

That mysalf and the people in attendance stayed at the hearing site for two hours and the following proceedings were had, to-wit:

* * * * * * * * *

MR. PERSONIUS: This is the last of eight meetings on the Draft Environmental Impact Statement for tha Tongue River Basin Project. The purpose of the meeting tonight is to take your commente on the Draft EIS. That's this document here, if you havan't saen it before. Hopefully, you have.

My nama is Tim Personius. I'm with the Bureau of Reclamation in Billings, and I'm just going to etart things off here. My job tonight really is to maka sure that anyona who has comments or questions about the Draft EIS gets their questions anewered and their comments recorded. Carol Hendrickson is a court reporter. She's going to take any comments that you

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have, and comments will be entered into the final EIS and answered. So it's important if you want to make comments, tonight is a good night to do it.

You may also submit written comments. You have until August 4th to do that. We have some forms you can taka with you tonight if you want to make comments on, or you can simply write a letter and the address is on here. If you want to submit written comments, you can submit written and oral, also, if you'd like. There is no limit on comments, just tha time period, August 4th.

We are going to start tonight's meeting with a presentation by John Sanders of DNRC. John has bean working on this project for a number of years and he is going to giva an overview of the Draft EIS and the altarnatives, and then we will do a question-and-answer period. During that, the way it's been going, if you have comments to make, we can just go into comments, as well. If you want to make a comment, all we ask is that you state your name for the record and that you just tall us, "Okay, I've got a comment," and Carol will take your comment and these guys, the team that's worked on this document, will know what they have to do to address your comments.

There are not very many commanters here

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tonight, so I don't think we will have too many time constraints to worry about. We can be here until 9:00 or something if need be. That's about all I have. John.

MR. SANDERS: Thanks, Tim. I'd like to make a few additional introductions that Tim didn't just in case there are a couple of people out here who don't know everyone yet. As Tim mentioned or may have mentioned, I'm with the Department of Natural Resources. Also from DNRC with me tonight is Ned Pettit. Ned is the Environmental Coordinator for the Water Resources Division and is the coordinator who has helped put this document together and will be working through the final EIS.

Also from DNRC is Keith Kerbel, manager of our regional office here in Billings, for any of you who don't know him. Katherine, if you haven't met Keith yet, he's a good guy to know here in our Billings office.

From the Bureau of Reclamation, we have, in addition to Tim, we have Mark Albers. Mark has been working with us to ensure compliance with the National Environmental Policy Act and the cooperative agreement, the settlement act and the various other things that we have to deal with in working in the

Tongue River Basin Project.

We hired an environmental consulting firm to produce the Draft Environmental Impact Statement. That was Morrison-Maierle Environmental. Mike Pillinger is here with us tonight. He's president of MME, and he and the team of his experts in various disciplines put together the Draft EIS.

We also have two representatives here from the Northern Cheyenne Tribe. Ernie Robinson is the Tongue River Project Coordinator in Department of Natural Resources on the Northern Cheyenne Reservation. Ernie is right here; and we have Butch Sootkis from the Culture Commission Land Committee, Northern Cheyenne tribal member that's here with us, as well.

As Tim mentioned, we've got a couple of purposes for the meeting; and for consistency's sake, I'm going to go through the entire presentation here tonight and then take questions and give answers just as we have in the other seven hearings that we have had. The dual purpose tonight is to describe a little bit about the Tongue River Basin Project -- it's a little bit bigger now than just Tongue River Dam. It includes the entire Tongue River Basin from the Wyoming border to Miles City -- and to get any

comments from anyone here representing the public or another agency who wants to put formal verbal comments on the record now; and, again, as Tim mentioned, there is no limit to the number of comments you can make or written comments, if you prefer, later, and those written comments need to be postmarked by August 4th, the end of the comment period.

What is the Tongue River Basin Project? First and foremost -- Barb, you are pretty well aware of the Tongue River Project that you and I have worked on for so many years -- is to repair and enlarge the Tongue River Dam and spillway. There are two other components of the project that we are dealing with, as well: partial fulfillment of the Northern Cheyenne Indian Reserve Water Rights Settlement Act of 1992, and then conservation, development and enhancement of fish and wildlife resources and habitats in the entire basin.

What is the purpose for the Tongue River Basin Project? This project is being proposed because we do have an inadequate spillway at Tongue River Dam. It's being proposed to alleviate dam safety concerns and to protect all lives and property downstream. We have 32,500 acre-feet of stored water in the reservoir under contract with the Tongue River Water Users'

Association and 7,500 acre-feet of water under contract to the Northern Cheyenne Tribe. We need to protect all those existing contracts in the reservoir. Again, to partially fulfill the Settlement Act with the Northern Cheyenne Tribe, we need to provide up to an additional 20,000 acre-feet of water and again enhance fish and wildlife resources in the basin.

Why is the project needed? All of the goals of the Tongue River Basin Project are components of the Settlement Act. That Settlement Act was signed by President Bush September 30, 1992, and it ratified the compact that had already been negotiated between the State of Montana and the Northern Cheyenne Tribe. That compact was to quantify the reserved water rights that the Tribe holds in the area.

The compact and the Settlement Act define the need for the project as Tongue River Dam is currently unsafe. Downstream lives and property are at risk, including ones on the Northern Cheyenne Reservation and others all the way to Miles City. The compact requires the 20,000 acre-feet of new storage, or up to an additional 20,000 acre-feet of new storage that we have discussed.

The United States government, acting through

both the Bureau of Reclamation end the Bureau of Indian Affaire, hae trust responsibilities to the Northern Cheyenne Tribe. Any esaets that are held by the Tribe heve to be protected by the United States for the Tribe itself or individual members of the Tribe. Then beceuse of human activity in the Tongue River Basin, fish and wildlife resources and habitate have suffered and we need to enhance those resources.

I think everybody here ie probably well awere of who ie proposing the project end why. We ere working with a three-way partnership that at leaet seems to me and some of the people that have worked on it qnite awhile that it'e very unusual. It'e a pretty speciel thing to have the United States government as a partner, a sovereign netion or an Indian tribs as a partner and then the State of Montana acting through the Department of Natural Resources ae a co-sponsor and partner. So it's been a one-of-a-kind project to work on so far.

We are here tonight to take comments on the Draft Environmental Impact Statement that hes been prepared by the project sponsors and distributed to the public. An EIS is required under the National Environmental Policy Act if there'e federal funds, lande, projects or whatever involved. It's also

required under the Montana Environmental Policy Act when a state agency is taking an action. Both those laws require a comprehensive report to address how a proposed project, the Tongue River Basin Project in this case, will affect the environment. Typically, an EIS looks at the environment itself, the physical and actuel things that are out there on the ground or in the water, affected economies, socioeconomic-type concerns, cultural resources, recreation, anything that comes under the heading of "environment."

An EIS is typically and the Tongue River Basin EIS was prepared, or will be prepared once we have finelized everything, in two phases. The first phase is the draft, which some of you have and which is what we are here tonight deeling with, ie the Draft EIS. A draft environmental impact etetement deecribes a proposed action, identifies alternatives to that action and then analyzes the impacts of the action or the alternatives to that action. Once we have gotten through the public-comment period, which is where we are now, we will produce e final environmental impact etatement. That final EIS will take the comments, record them and, efter the analysis of those comments has been done by the project sponsors, it will present our responses to the comments and eny updated

information and analysee that have been required in the document ae a result of the comments.

The first phase of the EIS or the process, the Draft, indicated that we have to identify alternatives. So we have, through ecoping other activities that the agencies and project sponsors have done in the past, identified numerous alternatives to the Tongue River Project. In the Dreft Environmental Impact Statement, we list three alternatives that I will discuss briefly now. There are also a number of alternatives thet were generated through ideas that came up as to something elee thet we could do as an alternative to a new spillway, raise the reservoir four feet, and those alternetivee are in the document as alternatives that have been considered bnt dropped from fnrther consideration, and the reasone are given in the document for why thoee other alternatives were dropped.

The first alternative, or alternative No. 1 in the document, is called a labyrinth weir. This alternative came out of a special etudy report thet the Tribe, Bureau of Rec and DNRC did jointly back in '91 and finalized in '92. The labyrinth-weir-type spillway hae an accordien or zigzeg-sheped weir crest, and it's the crest of the spillway that actually

controls the high-water mark or the fnll pool of the reservoir. Thie ie roughly a 25-foot high structnral, reinforced structural concrete wall. It's a very maseive structure when you take the weight of the concrete here and the rest of it into account.

Behind the weir crest, the labyrinth weir, is a typical spillway chute spilling basin, and this alternative includes rehabilitation and the possible realignment of the existing low-level outlet works and the addition of an euxiliary outlet worke likely on this side of the spillwey. Alternative 1 as well as Alternetive 2 do elso include the enhancement of fish and wildlife habitats in the basin.

As we were doing the special etudy report, there wae proposed a roller-compacted concrete spillwey, or RCC for short. The special study report indicated at that time, mostly becanse we had done more preliminary engineering analysis on the lebyrinth weir than we had on the RCC, the labyrinth weir spillway was the preferred alternative at that time. Since we've gotten through the analyees that went into the Draft Environmentel Impact Statement considering those two alternativee, we have identified Alternetive No. 2, roller-compacted concrete combination of spillways, ae the environmentally preferred

alternative. This alternative proposes to put in a new, smaller concrete chute spillway with, again, a crest that would raise the reservoir level four feet, rehabilitate the existing low-level outlet works, put in an auxiliary outlet works; but the feature that this alternative is taking its name from is a roller-compacted concrete overlay over some or most of the existing earth and embankment. At this point it's being proposed that this RCC overlay have two different elevations or two different spillways, a narrower, secondary spillway to take mid-range floods and then the entire rest of the spillway would have to operate in order to handle the spillway design flood which is 100,000 cubic feet per second. Again, this alternative, same as Alternative No. 1, includes enhancement for fish and wildlife habitat in the basin.

The environmental policy acts that I referenced earlier also require that an agency or project sponsor in their environmental analyses consider the no-action, do-nothing alternative. Under this alternative, no action would be taken at Tongue River Reservoir. We wouldn't do the fish and wildlife enhancement. We wouldn't provide the water to the tribe. We would just do nothing, and that satisfies

no goals or needs of the project.

Just a little information about both the EIS schedule, which we are in now, and then the general project schedule. In March 1993, we had nine public scoping meetings to present more of an overview of the project then than what I have given tonight and get questions from the public or, in some cases, to have the public actually propose alternatives that may have needed to be addressed in the Environmental Impact Statement. June 5th of this year we made available to the public that blue Draft Environmental Impact Statement on the Tongue River Basin Project. That began a 60-day comment period, which is the comment period which ends August 4th. This week, the 17th through the 21st, we have done seven, this is number eight, public hearings to take comments on the draft document itself, and in most cases to also answer a lot of questions about the project.

We have mentioned ad nauseam August 4th is the deadline for comments on the Draft; and, again, if anyone puts in a written comment, we will accept an August 4th postmark. We hope to produce the document, the final Environmental Impact Statement which records those comments and our responses to them by December 1995. Given that schedule, we would anticipate a

record of decision issued which would state what the project sponsors' agreed-upon action is. We would expect that record of decision in February of '96. Late summer, early fall we project that we would do some project-related road work. We need to realign, straighten, relocate portions of the county road that go from the oiled highway into the dam. Sometime in the construction season, as early as possibly 1997, actually begins the dam rehabilitation constrnction. It will likely be under construction two actual construction seasons, '97 and '98; and since there are so many related activities that will be going on, state park relocation, mine mitigation, a lot of work on the riprapping Highway 314 and stuff, we don't actually expect construction closeout until as late as October of '99.

That is all the information that I have typically been presenting at the hearings. Again, there are two ways to make your comments or wishes known on the draft document. Put a comment on the formal record tonight or send a comment to Ned. As Tim mentioned earlier, what seemed to have worked better the last two or maybe three hearings was not to separate the question-and-answer period from the formal comments. We will take as many questions as

anybody wants to ask; but if you would like a comment particularly noted as a formal comment, give Carol your name, tell her that you are making a comment. We will record everything, questions, answers and comments alike. So Tim and I can throw it open now for any additional questions, any information anybody else wants to ask us about or formal comments. Yes, Steve.

MR. POTTS: I guess I have a question, a real basic one. How is the 20,000 acre-feet arrived at in the settlement agreement between the Tribe and the State? 228

MR. SANDERS: Rich? Rich Aldrich is with the field solicitor's office here in Billings and Rich knows as well as anyone how that was arrived at. My lateral to Rich --

MR. ALDRICH: Are you asking hydrologically or why that was the settlement figure?

MR. POTTS: I'm just curious as to how they arrived at 20,000. Why not say 15,000 acre-feet and cash or some other confirmation. Is there any easy way to provide some background? 228 CONT.

MR. ALDRICH: Well, the best way to describe it is that, first of all, it was a negotiated settlement and there were concessions made on both

sides, the State and the Tribe's. In preparing for the ultimate litigation of the Tribe's water rights, the United States did studies that involved what we consider the normal components of a reserved water right, water for municipal use, domestic use, stock use, agricultural use in the present and the future and also water for industrial use. Even though politically right now the Tribe does not want to develop its coal because the Tribe has significant coal reserves both on and off the reservation, there was an opportunity to combine coal and water for a very economically positive package. So a significant part of our mitigation package would have been water for industrial use for coal diversion facilities.

We came up with a number, if memory serves correctly, in the vicinity of about 150,000 acre-feet total for the Northern Cheyenne Reservation as being the figure that we would go into court and litigate on for all of those kinds of purposes. The State, of course, came in with a much lower number and one of their primary interests was the protection of the non-Indian water users and the existing water users on and off the reservation, particularly the Tongue River water.

As a result of the give and take and the fact

that there simply is not enough water in the system to fulfill the tribal needs that we identified and the non-Indian water users, we settled on a figure of about 97,000 acre-feet, including the State's 7,500 acre-feet in the existing contract for the Tribe. If you add up all of the various water components, it adds up to about 97,000 acre-feet.

So I can only answer very obliquely, the 20,000 acre-feet of storage from the Tongue River Dam was necessary to satisfy what we believed to be a legal entitlement of the Tribe with a potentially very senior water right that can adversely affect existing non-Indian water users; and in order for them to agree that they would not adversely affect those non-Indian water users, then we had to dedicate the entire 20,000 acre-feet of new storage to the Tribe.

228 CONT.

MR. POTTS: So the 20,000 acre-feet is part of this 97,000 acre-feet?

MR. ALDRICH: That is correct. The 97,000 acre-feet, don't hold me to that. That's an approximation. It's 12,500 from natural flows from the Tongue River, itself; 20,000 acre-feet from Tongue River Dam, new Tongue River Dam storage; 7,500 acre-feet from existing Tongue River Dam storage; 30,000 acre-feet from Big Horn Reservoir; and then

about 1,800 acre-feet with the first right on Rosebud Creek and 16,500 acre-feet -- 19,000 acre-feet, give or take, unless you're -- What's your figure?

MR. SANDERS: I don't know.

MR. ALDRICH: With a priority junior to the existing non-Indian water users. So that water is very -- if it's there, the Tribe can use it, it can develop it if they can do that without harming the existing non-Indian water consumers. So that should total up to something just under 100,000 acre-feet.

MR. SANDERS: Steve, I lateralled your question to Rich because Rich was actually one of the negotiators of the compact and that particular portion of the project predates my involvement. In fact, it predates most of us in here that are working on the project now besides Herb.

MR. ALDRICH: Herb definitely predates me.

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MR. POTTS: How about the 20,000 acre-feet that's going to be provided by this project, how much is known about how that would be used by the Tribe? It sounds like not too much is known.

MR. ALDRICH: That's correct. Our litigation studies were based upon hypothetical water uses; as I said, possible coal conversion, large

amounts of future irrigated agriculture on the reservation and also possible water sales. I think that the EIS, if memory serves correctly, commits to a tiering process. The EIS analyzes water use in terms of total accumulative impacts if all of the water were used; and then at a later date, when the site-specific water uses are developed, there will be an additional environmental compliance.

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MR. POTTS: And that environmental compliance will be overseen by the Bureau of Indian Affairs?

MR. SANDERS: Actual use of the Tongue River direct-flow water, the Tongue River storage water and the Rosebud Creek water is BIA. Use of or marketing of the Yellowtail Big Horn Reservoir water is BOR. That component of the Settlement Act as far as NEPA compliance at this point is covered in a programatic EIS that exists, and it includes Boysen and Yellowtail, both, Rich? It's a programatic on that part of the system.

MR. ALDRICH: On Boysen and Yellowtail.

MR. SANDERS: Yes; so that 30,000 acre-feet is programatically covered in an existing Environmental Impact Statement and any site-specific uses or marketing uses of that water will be under

DOR's lead federal agency responsibilities under NEPA. But there is a 10-year moratorium on Yellowtail water?

MR. ALDRICH: That is correct, 10 years from the passage of the act.

MR. ROBINSON: Unless the Northern Cheyenne agree.

MR. SANDERS: Agree, thanks, Ernie. Steve, did you meet Ernie Robinson?

MR. POTTS: I did just before the meeting here. Do I understand that it's likely that another EIS would be done when the Tribe knows how they intend to use their 20,000 acre-feet, or at least some environmental document? 231

MR. SANDERS: Some environmental document, a CEC, a FONSI after an EA or a full-blown EIS, if necessary.

MR. ALDRICH: It will simply depend on the scope of the project.

MR. ROBINSON: Any sale or lease, each sale or lease will require some type of environmental action as it relates to NEPA.

MR. POTTS: Is there any idea when these documents and these things may be better specified and done? 232

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MR. ROBINSON: Within the next two years.

MR. SANDERS: Anything else, Steve, or just lots?

MR. POTTS: Just one, actually. We talked a little bit about this informally before this meeting, and that is that on Alternative 2, it looks like the construction of the auxiliary low-level outlet works is not assured like it is with Alternative 1; and it isn't quite clear to me why that is for sure a part of Alternative 1 but not a part of the preferred alternative. 233

MR. SANDERS: I think I will just make a note for the record, Carol, that we will treat that as a comment and clarify that in the final EIS as is appropriate. I'm also expecting, Steve, if you have more than just questions after you've talked with the people in Denver and in-house in Helena, that we will probably get some written comments from EPA; but we will -- Ned, note that, yourself, make a mental note that we need to make that more clear than it apparently is in the Draft EIS, that we at least intend the auxiliary low-level outlet works to be a component of the RCC alternative if it does indeed prove through final engineering design to remain the preferred alternative.

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Katherine, do you have any questions? Herb?

MR. MOBLEY: A couple.

MR. SANDERS: Questions or comments? Formal comments on the Draft EIS or just questions?

MR. MOBLEY: Nothing formal. I'm ashamed to admit that I haven't had or taken time to really study it.

MR. SANDERS: Did we send you a copy?

MR. MOBLEY: I have a copy. It's all my fault. I haven't looked whether you have in there the difference in cost of these two alternatives. 234

MR. SANDERS: Yeah, we do, Herb.

MR. MOBLEY: I thought you had; but the cost is one point and safety is another. Just as a bystander observing them, and I've heard a little about them, it looks like some stopgap deal you're settled on. That's a farmer's opinion, I guess. 235

MR. SANDERS: Some additional engineering that we did on the RCC led us to believe that it was more than just a stopgap measure, Herb. It looks like a very viable alternative and runs roughly $10 million less than the labyrinth weir.

MR. MOBLEY: Back over the years, I recall the labyrinth weir was like number three or four alternative. In other words, it has come up to 236

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number one by tossing aside the original or the previous ideas. 236 CONT.

MR. SANDERS: Yeah, the labyrinth weir was arrived at after quite a bit of analysis of other alternatives. The labyrinth weir was in the hopper when I started working on the Tongue River Project, so I didn't get much involvement in any of those other alternatives that were looked at and dropped early on.

MR. MOBLEY: It came on about the same time you did. I guess my question would be as to whether everybody is -- I guess my question is whether everybody is convinced that you are making the dam safe, as was originally intended. 237

MR. SANDERS: Pretty much so, Herb. The Environmental Impact Statement indicates that Alternative 2, the RCC, is the environmentally preferred alternative. Help me, Steve, if I say something out of line. The environmental laws that we are dealing with do not require us to construct the environmentally preferred alternative. The action could be something different from that as long as we have fully analyzed the alternatives and identified the effects or impacts and how those impacts would be mitigated.

We are this week, and it's probably going to

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take us a couple more weeks, Herb, in the process of hiring the final design consulting firm. Whoever gets that contract for actual engineering design will refine the preliminary engineering work that we have done on both the labyrinth weir and the roller-compacted concrete spillway or combination of spillways and make sure that we have the factors of safety in there that we want under either alternative and determine which would be the preferred engineering alternative.

Once we got Mike Ulrich on board as project engineer and he did some in-depth studies of other RCC dams and RCC spillways, we got to be pretty confident that it was a viable alternative; and it does have, besides the economy part of the environment, it does have some additional environmental reasons to be preferred environmentally. It doesn't change the downstream floodplain as much as the labyrinth weir would. It seems like there was something else I had made a point of before. Herb, we did quite a bit of analysis, hydrologic and safety analysis of the two alternatives; and under the labyrinth weir, when we are working right here in the construction area, we will have a temporary coffer dam there and Mike feels confident only in storing up to about 30,000 acre-feet

behind this coffer dam under this alternative, given the different lengths of construction in this one location and the type of construction. Under the RCC alternative, coffer dams have a little bit different configuration. We're not excavating as deep. We're not going to be under construction right here as long, and he feels confident storing up to 45,000 acre-feet behind the coffer dam if we do the RCC alternative. So given a good runoff year, we could satisfy the contracts or have a better chance of satisfying the contracts under the RCC alternative.

So there are a couple of the major reasons that this one is preferred environmentally; and thank you, Phil, for reminding me of that important one.

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MR. POTTS: When you go about the construction and have to draw down the existing reservoir storage, it sounds like you would have to have elevated or surge flows in the river as you release water from the dam. I guess I haven't gone through the EIS enough to know how well you have analyzed the effects of those surge flows.

MR. SANDERS: We propose the lowest drawdown during work around the inlet tower to be at 9,000, actually I think it's 8,600 to 9,000 acre-feet. We have in some years drawn that reservoir

down to 12,000 or 14,000 acre-feet just during normal irrigation in the fall when we didn't have a good runoff year; and typically, Steve, we are down in the fall to 20,000, is not unusual, as I recall. So it's not like we had to open the gates up to, you know, like Yellowtail right now is 14,500 or 15,000 cfs. We don't anticipate actually having to really flush the river to draw it down to 9,000.

For several weeks this spring, we had an outflow at Tongue River at 3,000 cfs; and we did lose some river bank, we did a little low-level flooding, but we don't anticipate the kind of problem or concern that you bring up just to lower it down to 9,000 acre-feet.

Do you have any questions?

MS. FORRESTER: I'm Jeanne Forrester. I'm here from Congressman Pat Williams's office.

MR. SANDERS: Hi, Jeanne.

MS. FORRESTER: I'm just here to listen because I know that Pat was one of the ones that introduced legislation on this in 1991.

MR. SANDERS: Appreciate you coming by.

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MR. POTTS: Would it be too much to ask for kind of an overview or summary of these fish and wildlife enhancement activities that are also proposed

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as part of this project?

MR. SANDERS: No, it wouldn't. We had the document open to that page last night, Ned. What page was that? What we have in place, Steve, is a team representing Bureau of Reclamation, U.S. Fish and Wildlife Service, Department of Natural Resources and Fish, Wildlife and Parks, and we have come up with a list of potential projects that could be included in some scenario to enhance both fish and wildlife resources in the basin. Those 11 or 12 potential types of projects are listed in -- Oh, I thought you were trying to give me a page number. We have programatically discussed those in this document and committed to further environmental analysis as required when the projects are actually identified.

We are not far enough into the planning process now to actually have any site-specific projects for enhancement identified. The list is right there, but something that really appeals to us is riparian management along the river itself and the major tributaries. A perfect world would let us develop a corridor of conservation easements or some type of riparian management along the river. Wetlands enhancements or new wetlands developments. The Northern Cheyenne Tribe has proposed additional bison

restoration. Fish passage structures around some of the existing diversion dams in the river itself. We are still in such preliminary planning stages that we don't have any site-specific areas, as I say, to actually go out and analyze.

MR. POTTS: Has there been much dialogue or discussion with the Army Corps of Engineers on this 240 dam project related to getting the 404 permit?

MR. SANDERS: Quite a bit. I did some preliminarily. Roughly the same time that you and Dick came over, we were starting to describe the project to Mac and Ernie and his crew. Ned has had additional contact with the Corps. Steve Oddan and Mark Albers, two of the members on the mitigation and enhancement planning team, have met and discussed things quite a bit with the Corps, Steve probably more than the rest of us. So the Corps is aware. They know what kinds of things we are proposing. We have talked to them about mitigation and enhancement, both, needs for the various permits or what specific activities may drive the requirement for a permit. So we have been in touch quite a bit with the Corps. It's easy for my agency because all we have to do is go to the basement; but, yes, they are aware and, yes, we have been in contact with them quite a bit.

MR. POTTS: The reason I ask that is typically you would see a little more specific 241 identification of the wetland impacts of a project so that a wetland mitigation plan could be more specific so you know that it replaces the wetlands lost by the project. At some point you will have to do that. It doesn't seem like you have done it here.

MR. SANDERS: Yes; and have to ensure that in the combination of enhancement on top of the mitigation that we have proposed, we more than account for or mitigate more than what's actually potentially lost. The intention is to make sure that we have much more wetlands in the basin than what we actually lose around the reservoir. And, yeah, we are talking to them specifically about our wetlands issues.

Do you want to add anything to that, Ned? That's just kind of general.

MR. PETTIT: That pretty much covers it. Larry Robson has been our primary contact in recent months, and he had requested that we discuss things specifically with him as we move toward the permitting phase; but that was essentially going to follow distribution of the draft.

MR. POTTS: Another question, I guess. As I understand it, or saw on the table, the storage 242

capacity of the reservoir upon completion of this project would be 80,000 acre-feet, and that 80,000 acre-feet, I guess they anticipate that, what, 40,000 acre-feet is already contracted out to the Tongue River Water Users' Association and the Tribe, 20,000 242 CONT. additional would go to the Tribe. That brings it to 60,000 acre-feet. What happens with the remaining 20,000 acre-feet? Is that an instream storage requirement or instream flow or are other uses anticipated for that?

MR. SANDERS: We don't anticipate other uses. It's not specifically earmarked, Steve, that I would know of. Rich?

MR. ALDRICH: That's really not water that's available for disposition. That's necessary to provide as close to firm annual yield for the uses that are proposed of the 65,000. So that would be carry-over storage from year to year.

MR. SANDERS: We have done quite a bit of firm annual yield analysis, computer modeling of the river itself and then the operation of the reservoir, and we have to consider various scenarios of use of the tribal water and we also have to consider Wyoming's allocation of the Tongue River under the Yellowstone compact. So we have more scenarios than I

can recall; but any one or two or four or five given scenarios of tribal water use are analyzed under two cases. The one case is status quo in Wyoming. They don't use anymore of their Tongue River water or they use all their water. So as best we can analyze firm annual yield, up to an additional 20,000 acre-feet of water for the Cheyenne is accounted for by the firm annual yield analyses and some exchange water. So that other water is, like Rich says, carry-over storage, enough to keep the reservoir alive if it's not used or if we're in good runoff years, every year or something. You are on a roll, Steve. Keep going.

MR. POTTS: I hate to ask stupid questions; but you mentioned that Wyoming has water 243 rights they haven't fully developed. What would happen if they fully developed their water rights? Would there be enough water coming into Montana to fill the reservoir and use the Montana water?

MR. SANDERS: That would depend some on the use scenarios of the Tribe's water. I can't quote you exact numbers of years or percentile flows that are satisfied if they use all their water, but it does mean there is less available in Montana, obviously. But consideration of that full use of Wyoming's water is part of what went into the negotiation of the final

figure for water allocated to the Tribe; and in preparing the Draft EIS, we contacted the state engineer's office in Wyoming. Some of them attended our scoping meetings in Sheridan and we met with them a couple of times and contacted them to confirm at least at this point they have no permit applications for projects on the Tongue or no state projects proposed or anything that's been applied for under their water development loan and grant program. So today, and I know today doesn't get us to very many tomorrows always, but today it looks like status quo in Wyoming in the Tongue River Basin.

Becoming familiar with the Tongue above the Wyoming line up to the headwaters, it appears it's pretty fully developed as far as irrigation water goes. Safe statement, Herb? There isn't a whole lot of additional ground up there that looks like it's developable.

MR. MOBLEY: Can't help you. I don't know. I left Wyoming too long ago. Wrong side of the mountains, at that.

MR. SANDERS: Questions or comments, Rich?

MR. ALDRICH: No.

MR. MOBLEY: I've got one more question.

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Way back on the chart you had up, I didn't keep track of them, but you had one on the bottom line that says something like, "Human activity has" --

MR. SANDERS: Degraded the fish and wildlife resources in the basin?

MR. MOBLEY: Yeah. When and how did you decide that and when did it happen?

MR. SANDERS: Can I lateral that question, too?

MR. MOBLEY: No. It wasn't there when I left. I didn't know we did that.

MR. SANDERS: Somebody else want to field that?

MR. ALDRICH: That project's conclusion was reached before I came on board.

MR. SANDERS: Herb, you've got a lot more history down there than I do; but typically when man shows up, other things start suffering, the environment, silt-loading in the river due to activities up and down and around the river. I personally don't know that there are less fish and less wildlife and less waterfowl down there than there was; but typically we can identify areas where man being around or whatever impacts they are having on the environment have degraded fish and wildlife

habitat and resources.

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MR. MOBLEY: Typically, but does that include the Tongue River or are you guessing?

MR. SANDERS: Well, I've only been actually on the river from the dam to Ashland; and I can think of a couple of specific places that you can see quite a bit of degradation of the river bank and there's less forage right up to the river because of agricultural activities and less cottonwoods. The old ones are dying out and new ones aren't regenerating; but I am not saying it's a bad one.

When the mitigation and enhancement team did the field work on that portion of the river, we were pretty surprised, actually quite pleased that it wasn't as degraded as we might have thought before we actually went down and looked; but we haven't done the river yet from Ashland on down to T & Y or on to Miles City.

MR. ALBERS: That riparian system especially on the Tongue is in better shape. We did a canoe trip and looked at it last year, and I was quite surprised, too. The lower basin, I think, is more heavily utilized for agriculture and some grazing purposes; and I believe down below there are more impacts than there are up above. There are impacts,

though. You can see where the grazing has come right down to the water. You are not seeing the regeneration of the cottonwoods mainly due to damage inside the channel.

MR. SANDERS: It's not meant to be an inflammatory statement against man's development or agriculture in general. It's just pretty typical.

MR. MOBLEY: No, that just caught my eye. Evidently maybe the point here is that that has just been thrown in. I guess I'd better make a comment being as you don't have a definitive answer for my question. My name is Herb Mobley and I did live on Tongue River for 37 years, and the Tongue River Basin, as I recall, when I left in May of 1994, had more deer, more coyotes, more bald eagles, more prairie dogs. Most any species you could name had increased at the time, the 38, 37 years that I lived there, and I believe Tongue River Dam has something like 20, 30 species of fish now. When I moved there, it had maybe two. So I question that statement you have on that chart.

MR. SANDERS: Your comment is noted, Herb, and we will analyze it.

MR. MOBLEY: I'm not trying to pick a fight with anybody, but I just happened to observe

that.

MR. SANDERS: Probably means field work further down the river.

MR. POTTS: I thought of another question. As I was looking through this EIS, I saw something in here that said potentially one of the more adverse environmental impacts of this whole project would occur during a critical two-week period of construction, I think when they may be reconstructing the low-level outlet works, and there would be a minimum low flow of only 25 cfs in the river below the dam. Could you kind of describe briefly the construction process and why maybe a greater flow could not be bypassed to maintain a higher than 25 cfs flow in the river to mitigate that critical impact? 245

MR. SANDERS: Did we not, Phil, indicate that that was a worst-case scenario, definitely, and that it may not happen?

MR. STEWART: I don't remember about that particularly, John.

MR. SANDERS: I'm having a little trouble remembering, too.

MR. PETTIT: That was in the event of the use of a bypass. We proposed two different scenarios

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for rehabilitation of the low-level outlet works. One included a bypass structure that our project engineer developed. The second was the use of an auxiliary outlet works which is actually included in the preferred alternative right now.

In the bypass, I think you would have to install that structure which would then bypass flows through the outlet works, still allowing for rehabilitation of that structure. It would take about a day to get that in place where those 25 cfs flows were identified. That could potentially go longer. We identified a period of two weeks, but that was considered pretty unlikely by our project engineer. Nonetheless, we decided to disclose the fact that if something, adverse climatic conditions were to surface during the period, it could be a significant impact.

We will have pumps on hand under that proposal to increase flows as needed as DFWP personnel identify those needs; but like I said, the preferred alternative now includes the auxiliary outlet works, which would negate those concerns all together.

MR. POTTS: So if the auxiliary outlet works is included in the preferred alternative, you wouldn't need to get anywhere near that 25 cfs flow. 246

MR. PETTIE: Right.

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MR. SANDERS: I guess that's why I was having trouble reaching back and being able to describe that. I had long ago forgotten the bypass structure. That was a proposal as part of one or both of the alternatives at one time; and since we have identified the auxiliary low-level outlet as being part of our preferred alternative, we don't need that bypass if that's how it shakes out when we are finished with the final engineering design. So we would not indeed have that concern about that 25 cfs flow. I had totally spaced that bypass structure.

MR. PETTIT: We had several meetings, and in attendance were, I think Phil Stewart came up from DPWP in Miles City and we had Steve Oddan from U. S. Fish and Wildlife Service and project representatives from all three project sponsors. We discussed that at great length; but to disclose all potential impacts, we kept that bypass proposal in the document to provide as much information for not only the project sponsors and decision-makers, but for the public, in particular, because if that were actually the route that we pursued, there is the potential impact.

MR. POTTS: I'm glad to hear you say that the auxiliary low-level outlet works is now a part of the preferred alternative; but the way I read the EIS, 247

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it's not part of the preferred alternative. 247 CONT.

MR. PETTIT: That reflects in part the fact that we identified the preferred alternative rather late in the process of preparing this document. So at the time of printing or just prior to printing the document, we inserted that and then tried to clarify that it did include the auxiliary outlet works. Certainly the final EIS will be more definitive in how we present the preferred alternative and the fact that it does include the auxiliary outlet works.

MR. SANDERS: Steve, in light of this discussion one thing that, Phil was actually the one who pointed it out in the Ashland hearing from his standpoint and I want to mention it from my standpoint tonight, I've worked on a lot of projects with DNRC and probably never had the cooperation and close working relationship with Fish, Wildlife and Parks. The reason John and Don and Phil are here tonight is because they have provided a lot of information: Phil with fisheries, John with campground relocation and stuff that we've got displayed up there on that display, and Don just in general working with his other staff people in the Miles City regional office, Region 7 office. They, in reviewing, editing and

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providing more information to our internal drafts, are why we feel the document that you have now is a much better document than it would have been without that cooperation.

I could say the same for Fish and Wildlife Service because of Steve Oddan's input, as well.

Steve, I know you are going to have more questions. I'd like to commit Ned 24 hours a day, 8 days a week, all week next week while --

MR. PETTIT: I've already been committed, but it was a different type of commitment.

MR. POTTS: As I was mentioning

248 informally before this hearing started, there is a project in Southern Colorado called the Animus La Plata Project, which is, as I understand it, proposing to build a new dam to satisfy a reserved water rights agreement in Colorado between the State of Colorado and the two Indian tribes down there. The big issue raised by EPA and other agencies on that project is that the use of the water should be better defined and analyzed and included in the environmental impact statement for the dam, and I'm perhaps concerned that our regional office is going to take the same position with this project, that there should be a better evaluation of the 20,000 acre-feet and of

248 CONT. the impacts of the use of that water. I don't know, but perhaps we can maybe set up a conference call where you folks in our Denver office, people involved in that Animus La Plata Project can discuss it. I think there's some real differences between this project and that project because you have an existing unsafe dam that you want to repair; but it might be helpful if we have a conference call as early as next week to discuss that, and maybe even connect the Northern Cheyenne Tribe in on that conference call.

MR. SANDERS: Steve, I believe the reason I recognize the name of that project is the legislation, federal legislation that was likely being considered at the same time the Tongue River/Northern Cheyenne -- Rich, isn't that one of the ones that was in the hopper at the same time as ours?

MR. ALDRICH: Yes. One of the big issues down there, as I understand it, that caused it to begin unraveling a little bit was there were some endangered-species issues that came up very late in the game; but our goal in this was to display and assess the cumulative impacts on the assumption that all of the water diverted to use for various kinds of purposes so that we would be able to assess those kinds of impacts, and those impacts are not going to

change depending on the type of water used and where it's used, and then we would adhere to the site-specific impacts.

The Tribe right now, for example, has some ongoing studies to look at use of water for a rural domestic water system throughout the reservation. They also have been doing some work to look at increased agricultural development on the reservation, and those are probably the two most likely short-term uses of the water. Other kinds of uses are difficult to predict until either a market for the water develops or a demand develops.

MR. SANDERS: Sounds like we should have Rich in on that conference call. I miss you, Rich. We haven't done anything together, it's been a year this month, in fact.

MR. PETTIT: We'd be happy to set up a conference call. If you wanted to coordinate that through myself, I would be happy to take the lead.

MR. POTTS: We will look at trying to do that next week.

MR. SANDERS: Anything else you want to ask, Steve? You drove further than we did today to get here just for this hearing. We only came from Miles City, but we came from seven of these hearings,

too.

MR. POTTS: I'm sure that as I read this more, I will have more questions; but I don't really have any significant ones I can think of that I haven't already asked.

MR. SANDERS: I think I have identified two pretty specific comments that will come out of your questioning and probably show up in your written comments. I'm sure you will have more, both questions and comments, that we will deal with.

MR. PERSONIUS: Herb, did you have anymore questions or comments; or, Jeanne, did you want to make any?

MR. SANDERS: Keith? I was going to ask Katherine, and then she saw me looking her way and left. Ned, anything to close it out? I'm done.

MR. PETTIT: No, I think what we received was very valuable. I appreciate your turning out and we will work closely with you in a coming weeks and up until the comment period ends; and any questions you have beyond that, definitely call.

MR. SANDERS: Thanks for coming down. Unless anybody else wants to make a formal comment for the record or ask more questions, we'll close this one out, too. Thank you everybody for coming, especially

my backup guys.

* * * * * * * * * * *

I further certify that the hearing concluded at 7:00 p.m. and that the above-indicated remarks were made and that they are true and correct.

Carol Hendrickson

Carol Hendrickson
Registered Professional Reporter

STATE OF MONTANA)
)
COUNTY OF LEWIS & CLARK)

Subscribed and sworn to before me on the 2nd day of August, 1995.

Carol Hendrickson

Carol Hendrickson
Notary Public in and for the
State of Montana
My Commission Expires 2/9/98.

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TONGUE RIVER BASIN PROJECT DRAFT EIS PUBLIC HEARING

Location: Billings, MT
Date: 7-21-95

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Comment Number

9.3 RESPONSES TO HEARING COMMENTS

174 *Fishery impacts are discussed in **Sections 4.9, 4.24, and 4.25 of the EIS.***

175 *DNRC's initial project schedules for the two alternatives are presented in the EIS and indicate that they each would take about the same amount of time (two construction seasons) to complete. These projections, however, are influenced highly by the rehabilitation plan. It is clear that the labyrinth weir alternative will require at least two construction seasons. If the existing spillway is reconstructed as part of the RCC alternative, it too would likely require two construction seasons.*

176 *For the RCC alternative, DNRC estimates that 30 to 40 workers may be required during rehabilitation of the existing spillway, with approximately 20 workers involved during RCC construction. For the labyrinth weir alternative DNRC estimates 30 to 40 workers may be required. Construction probably will be seasonal for either alternative. Other than the outlet works, most of the construction activity is not feasible during winter months.*

177 *DNRC has estimated that the cost of the RCC alternative would be approximately one-third less than the labyrinth weir alternative, as shown in the EIS.*

178 *The labyrinth weir alternative would route inflows that cause the spillway to operate differently at various reservoir levels. The coal mines by the reservoir, therefore, would be less effected by the 4-foot raise associated with the labyrinth weir alternative.*

179 *The final selection of alternatives will be made by the project sponsors in consideration of information in the EIS, including public and agency comments. The final decision will be stated in the Record of Decision signed by USBR.*

180 *The RCC alternative could store more water during construction than the labyrinth weir alternative, and therefore would have less impact on the reservoir fishery. Either alternative would have similar long-term impacts on fish and wildlife resources and habitat.*

181 *The State of Wyoming has been involved in the Tongue River Basin Project since the early 1980s when negotiations between the Northern Cheyenne Tribe and the State of Montana were in progress. Wyoming's interest at that early stage was directed primarily at ensuring that the state's compact allocations under the Yellowstone River Compact would not be jeopardized by the rehabilitation activities at Tongue River Dam or by other aspects of the negotiated settlement with the Tribe. In 1992 a separate agreement was developed between the governors of Wyoming and Montana recognizing Wyoming's present and future rights to Tongue River water. More recently, the Wyoming State Engineer's Office submitted comments on the Tongue River Basin Project Draft Environmental Impact Statement (draft EIS). Essentially, the comments reiterated both present and future Wyoming rights to Tongue River water.*

182 *For the most part, shoreline access will not change from the status quo. The exception is the land recently acquired by the Northern Cheyenne Tribe on the west side of the reservoir. The Tribe's north parcel has direct access to the reservoir at the diving cliffs.*

183 *The project sponsors are not proposing development on the east side of the Tongue River Reservoir. The only possible exception to this would be in the event that wetlands are developed at Kendrick Flats.*

184 *One of the primary purposes of the proposed Tongue River Basin Project is to remedy safety deficiencies of the dam.*

185 *Crowded camping conditions that can occur at Tongue River State Park on high-use holiday weekends such as Memorial Day and the Fourth of July, and to a lesser extent Labor Day, result primarily from the area's high desirability as a water resource in an arid region. Higher water levels at the reservoir during June and July of some years may actually decrease the number of available campsites. Use of less desirable camp sites that are less sheltered from the wind, on sloping terrain, or further removed from the water can occur during high use periods at the park. Crowded conditions that necessitate waits for boat launching can also occur during high use periods. Management and park design options being considered by DFWP to address*

these concerns include establishing a combination of designated and non-designated campsites and overflow camping areas within the park; a new 24-foot wide boat ramp at Campers Point; locating a second boat ramp at other points if necessary to relieve congestion, and a public information and education program.

186 *Approximately 85 water right holders are listed. However, others benefit from the Tongue River Basin Project as well. Tribal members will benefit from the storage and use of Tribal water. Every person living downstream of the Tongue River Dam will benefit by having a safe dam. Recreationists, fishermen, and others enjoy the reservoir. Further, the local economy is dependent in part upon the Tongue River Basin Project.*

187 *DFWP is interested in providing additional public access for fishing and hunting along Tongue River. As a member of the Interagency Mitigation and Enhancement Team, DFWP will explore the extent to which public access could be combined with acquired conservation easements for fish and wildlife enhancement. DFWP will also continue to explore other options for working with the Tribe and private landowners to provide additional public access.*

188 *Your support of increased fisheries management activities is noted. As described in* ***Section 2.3.9.4 of the EIS****, the aquatics and fisheries sections of the mitigation plan could include programs to increase fisheries management activities in Tongue River below the dam, if necessary. The following management activities are among the possibilities that would increase the number of game fish in the river:*

- *Monitor and possibly restock smallmouth bass in Tongue River between the dam and Ashland. Up to 128,000 2-inch fingerling smallmouth bass might be restocked.*
- *Supplement smallmouth bass and channel catfish populations between Ashland and the T&Y Diversion Dam through a one-time stocking of 77,500 2-inch fingerling channel catfish and 155,000 2-inch fingerling smallmouth bass.*
- *Agree to mitigate for unanticipated events such as winter kill during reservoir drawdown, or emergency or other short-term shutdown of releases from the dam during project construction.*
- *Restock the rainbow trout population in Tongue River below the reservoir.*

189 *When a portion of a streambank fails and falls into the river, the bank materials will eventually be transported downstream. In general, the finer the bank material, the less current necessary to transport it.*

Erosion of streambanks occurs under natural conditions on streams like the Tongue River. For a stream in equilibrium, streambank erosion is generally balanced by a like amount of sediment deposition. However, if the amount of sediment entering a stream is greater than the amount the stream can transport, deposition or "filling" may occur in the stream channel. On the other hand, if the stream has the capacity to transport more sediment than is entering in, excessive erosion of sediments from the streambed and streambank may occur.

*The dam probably changed the sediment dynamics of the Tongue River downstream. The dam traps sediment, and storing water in the reservoir has changed the seasonal flow patterns of the stream. However, no studies beyond those conducted by Bovee in 1975 have been conducted to determine what types of changes have occurred in the Tongue River below the dam (****see response to Comment number 121****).*

Repairing and raising the dam will not substantially change the ability of the reservoir to trap sediment. However, flood flows routed through the spillway would be greater under the labyrinth weir alternative than with the RCC alternative. Sediment movement, both erosion and deposition, will increase during these flood flows.

190 *Funding for the various components of the proposed Tongue River Basin Project was assigned by Congress via the Northern Cheyenne Indian Reserved Water Rights Settlement Act of 1992 (PL. 102-374, 106 Stat. 1186). The project sponsors, therefore, are not in a position to increase the amount of money appropriated for project-related mitigation activities. With current funding, however,*

environmental impacts related to the proposed Tongue River Basin Project will be mitigated as described in this EIS.

191 *Projects to enhance and possibly restore riparian habitat in the Tongue River Basin will be evaluated as part of planning for the fish and wildlife habitat enhancement program. The very streams mentioned in the comment are included in the study area. The project has already committed $4.6 million to enhancement. It is not likely more money will be allocated (**see response to Comment number 190.**). Opportunities to leverage that enhancement fund may present themselves in the form of existing programs.*

192 *Studies to identify and interpret the cultural resources around the Tongue River Reservoir have been continuing since 1992. An early part of those studies was a three-season ethnobotany study. The Northern Cheyenne worked with DNRC on that study. The project sponsors would welcome the Culture Commission or Tribal elders to perform a blessing ceremony.*

193 *One of the primary purposes for the proposed Tongue River Basin Project is to remedy the dam safety deficiencies at Tongue River Dam. After construction of the new spillway, the reservoir will be managed by a five-person advisory committee (**see response to Comment number 10**). The Northern Cheyenne Tribe is represented on that committee. The Tribal representative can convey wishes and desires of the Cheyenne people to the committee. Further, an emergency warning radio system (**see Section 3.13.3 of the EIS**) is in place to alert downstream floodplain occupants of any catastrophic events.*

194 *As mandated by both federal and state law, environmental compliance activities related to the proposed Tongue River Basin Project are directed at the Tongue River Basin as a whole. Certainly, the project sponsors focused mitigation proposals as close as possible to the area of impact. However, ecosystem management for the entire Tongue River Basin is a fundamental concept behind the project sponsors' approach to environmental compliance.*

195 *To implement the Tongue River Basin Project, the Northern Cheyenne Tribe, the U.S. Bureau of Reclamation, and the Montana Department of Natural Resources and Conservation entered into a series of agreements including the Cooperative Agreement for Implementation of Certain Aspects of the Northern Cheyenne Indian Reserved Water Rights Settlement Act of 1992, Including the Repair and Enlargement of Tongue River Dam in Southeastern Montana (Cooperative Agreement). One of the provisions of the Cooperative Agreement specifies the means of implementing project-related funding provisions, including cost-sharing arrangements among the project sponsors. As delineated in the cost-sharing section of the Cooperative Agreement, cost underruns will be shared by the parties in the same manner as cost overruns. With this in mind, any redistribution of cost savings attributable to the selection of a particular construction alternative likely will not occur.*

196 *With enactment of the Northern Cheyenne Indian Reserved Water Rights Settlement Act of 1992 (P.L. 102-374, 106 Stat. 1186) (Settlement Act), the federal government established two parcels of Tribal land in the area around Tongue River Reservoir. The location of these two parcels is shown on **Figure 2-4 of the EIS**. To familiarize Tribal members with these parcels, the Northern Cheyenne Natural Resources Department published their locations in two recent Tribal newsletters and numerous site visits have been conducted. Additionally, a series of public hearings was held in November of 1995 to discuss issues related to these lands, including management, maintenance, future development, and jurisdictional issues with the State of Montana. These same issues will be addressed again in a Tribal newsletter to be published in the coming months.*

197 *At present, DFWP undertakes weekly trash removal at the diving cliffs area. Negotiations are continuing between the Tribe and DFWP to resolve jurisdictional issues relative to administration of Tribal lands in the reservoir area. The outcome of these negotiations will identify permanent solutions to the need for trash removal and other problems in the area.*

198 *The Lee Homestead is listed on the National Register of Historic Places and must be protected or impacts to it mitigated. If the RCC option is pursued, spillway flood flows would be discharged to the east of the Lee house.*

Comment Number

199 ***See response to Comment number 1.***

200 *Although rehabilitation of Tongue River Dam would be completed in approximately two construction seasons (1997 and 1998), various other project components may require that construction closeout does not occur until sometime in 1999. These other project components include reservoir filling, final project inspection, and mitigation and enhancement activities.*

201 *Both construction alternatives analyzed in the EIS would limit the amount of water available to downstream irrigators during at least part of the construction period. The amount of water that will be stored during these times will be determined primarily on the basis of safety (**see responses to Comment numbers 139 and 144**). As described in the EIS, Alternative 1 (labyrinth weir alternative) would allow safe storage of up to 30,000 af of water during most of the construction period. Alternative 2 (RCC alternative), which is the environmentally preferred alternative, would allow safe storage of up to 45,000 af of water during this same period. The project sponsors recognize that the amount of water that can be stored safely during construction could limit downstream irrigation activities, but every effort possible will be taken to satisfy contract water to the greatest extent possible.*

202 *Under the RCC alternative, the auxiliary outlet could go under the existing spillway or through the dam in just about any location including the old river channel. Under the labyrinth weir alternative, the outlet would be installed just to the west of the spillway. In any event, final design will determine the exact location of the auxiliary outlet works.*

203 *Whatever reservoir storage is maintained during construction will be released in an effort to satisfy downstream water rights and contracts to the extent possible.*

204 *Low flows attributable to construction will be appropriated according to priority, similar to naturally occurring low flows.*

205 *The reservoir operations committee described in **Section 4.7.1.1 of the EIS** will oversee reservoir operations, which will be implemented by the Tongue River Water Users Association.*

206 *Comment noted.*

207 *Currently, water shortages during low-flow periods are shared pro-rata among all contract water users. **See response to Comment number 148.***

208 ***See response to Comment number 10** for information regarding postconstruction reservoir operations.*

209 *Comment noted.*

210 *Environmental compliance activities normally are conducted during preliminary project planning, especially in the case of a project like the proposed Tongue River Basin Project. This approach is necessary because the proposed rehabilitation of Tongue River Dam involves detailed engineering and federal and state laws prohibit final design activities until the project sponsors select a specific alternative. With this in mind, the information the project sponsors used to select an alternative, such as the information contained in both the draft and final EISs, can be considered preliminary design information. Understandably, this level of design will involve generalities.*

211 ***See response to Comment number 129.***

212 *To pass its design flows, the RCC spillway would be nearly the width of the dam embankment. Therefore, it would take an extremely large cofferdam to protect the site during construction. There probably would not be enough room to construct such a large coffer dam.*

213 *DNRC estimates the cost of the riprap to be nearly $3,000,000. This estimate is for the maximum quantity needed. There are no known local sources capable of providing that quantity of riprap. DNRC will talk with the Montana Department of Transportation and operators of the adjacent coal mines before we will be able to calculate the amount actually needed. Alternatives to riprap, such as soil cement and vegetative cover, also will be explored during final design.*

214 ***See response to Comment number 148.***

215 *It is likely that user levels will increase somewhat following completion of construction and park improvements, though exact levels cannot be predicted. Any restrictions that might be set for minimum reservoir pools within the final reservoir operations plan would be developed after construction by a five-member advisory committee with representatives from federal government, state government, the Tongue River Water Users' Association, Northern Cheyenne Tribe, and a fifth member to be selected by the other four (**see Section 4.7.1.1 of EIS**).*

216 *The project sponsors plan to fence (as a means of excluding cattle) the state park and the riparian vegetation/wetland areas in an effort to mitigate for any lost wildlife habitat. Some mitigation to make water available to livestock may be necessary.*

217 *The possibility of purchasing land and managing it to increase its value as wildlife habitat is being considered as part of the mitigation and enhancement planning process. The premise is that the land that is purchased can be managed to increase its habitat value. This increase in habitat value should be equal to the habitat value lost as a result of the project.*

218 *The enhancement planning component of the proposed Tongue River Basin Project is a dynamic process that will not conclude until after the project is well under way. During this phase of the project, all appropriate environmental regulations will be adhered to and public input will be sought. **See responses to Comment numbers 168 and 170**.*

219 *The proposed rehabilitated Tongue River Dam spillway was designed in accordance with Montana Dam Safety standards. The size of the spillway required for Tongue River Dam was determined by examining the threat that a dam failure would pose to downstream residents. This analysis determined that a spillway flow of 100,000 cubic-feet-per-second, which has a probability of occurring once in 5,000 years, needed to be passed without failure. For additional information, **see Appendix E**.*

220 *A secondary spillway constructed of structural concrete would be more expensive to construct and maintain than one constructed of RCC. Because much better aggregate exists along the edge of the reservoir, scoria likely will not be used as an aggregate for this project. Scoria is light, not as durable, and absorbs water, making it more susceptible to weathering.*

221 *Comment noted.*

222 *Regardless of which alternative is selected, the Tongue River Water Users Association's share of project-related costs will be no less than $5 million.*

223 *Please **see Section 1.4 of the EIS** for a discussion of the Tribe's federal reserved water right and the rationale behind it.*

224 ***See response to Comment number 200**. Even though overall project construction might last for two to three construction seasons, limitations on water availability will occur during only portions of the construction period.*

225 *Comment noted.*

226 *Comment noted.*

227 *Comment noted.*

228 *The Northern Cheyenne Tribe's federal reserved water right represents a negotiated settlement between the Tribe and the State of Montana. In preparing for litigation of the Tribe's right, the United States performed studies of what are considered normal components of a federal reserved water right. These include municipal water needs, domestic water needs, stock water uses, agricultural water uses, and industrial water needs. In addition, because of the occurrence of vast quantities of coal in the area, the potential use of water for a coal slurry pipeline also was examined. Based upon these studies, the United States arrived at a total projected water need to be litigated on behalf of the Tribe.*

During negotiations, the State of Montana also suggested an amount of water that it felt would satisfy these same water needs. The State's water use figure was admittedly lower than that of the federal government, but the State also was interested in protecting other existing water rights in the basin. Through the negotiation process, the two parties ultimately settled on an amount of water that was acceptable to both

sides. The additional storage water in Tongue River Reservoir (up to 20,000 af) is one of several components of this negotiated amount, which also includes an existing storage right from Tongue River Reservoir, a right to direct flows from the Tongue River, a Big Horn Reservoir storage right, and a right to water from the Rosebud Creek drainage.

229 ***See Section 4.24 of the final EIS*** *for additional information regarding Tribal water use and related impacts.*

230 *Additional site-specific environmental compliance for Tribal water uses will be the responsibility of BIA.*

231 *The level of environmental compliance regarding specific Tribal water uses will be determined during related public scoping activities.*

232 *Site-specific environmental compliance related to Tribal water uses will be conducted when the Tribe formally adopts specific water uses under its Tribal Water Code.*

233 *In the draft EIS, Alternative 2 - Roller Compacted Concrete (RCC) was presented in two different configurations; with an auxiliary outlet works and without. If without this outlet, the project would use a temporary bypass structure within the existing low level outlet works to pass flows during certain phases of construction. Installation of this bypass would require a one-time low flow of no less than 25 cfs for a period not to exceed 2 weeks. DNRC engineers considered both RCC options to be feasible means of achieving project goals, and therefore the decision was made to present both to the public and the final decision makers. As presented in the draft EIS, however, impacts to downstream aquatics and fisheries are greater with the use of the temporary bypass structure (by virtue of the required low of 25 cfs) than with use of an auxiliary outlet works. With this in mind, but rather late in the process of finalizing the draft EIS, the project sponsors identified Alternative 2 - RCC, with an auxiliary outlet works, as the environmentally preferred alternative. Because this decision was made so late in the draft EIS process, its coverage in the document was relatively minimal. The project sponsors apologize for any problem this may have caused.*

Since publication of the draft EIS, and in consideration of the numerous public and agency comments received in support of an auxiliary outlet works under the RCC alternative, the project sponsors have decided to include an auxiliary outlet works as a fundamental component of the RCC alternative. In the final EIS, therefore, all discussions of a temporary bypass structure have been eliminated.

234 *DNRC has estimated that the cost of the RCC alternative will be approximately one-third less than the labyrinth weir alternative, as shown in* ***Tables 2-4 and 2-6 of the EIS****.*

235 *There is no reason to believe that the risk of dam failure will be any greater for either alternative than for the other, once the project is completed. The risk of dam failure during construction is higher for the labyrinth weir alternative, as explained in the* ***response to Comment number 131****.*

236 *The planning process to repair and enlarge the Tongue River Dam has been a long and dynamic one. During preparation of the* ***Special Study Report****, the labyrinth weir design was identified as the preferred alternative. During preparation of the draft EIS, the RCC alternative surfaced as the environmentally preferred alternative.*

237 *Based upon the results of numerous analyses, the project sponsors are confident that the construction alternatives considered in the draft and final EIS are the most technologically feasible and cost-effective means of achieving the project goals, which include eliminating the dam safety deficiencies at Tongue River Dam.*

238 *Surge flows in Tongue River should not be required during construction as a result of reservoir restrictions. Construction timing and staged releases will take this factor into account and the project sponsors are not planning on lowering the reservoir level much more than what DNRC occasionally does now following irrigation.*

239 ***See responses to Comment numbers 168, 170, and 218****.*

240 *Discussions with the COE regarding a Clean Water Act Section 404 permit have been in progress for some time. It has only recently*

become clear to everyone that an individual 404 permit may be required for the project.

241 *A jurisdictional wetlands delineation for the project has been completed and a preliminary wetlands mitigation plan prepared.* ***See responses to Comments numbers 89, 94, 95, 115, and 116*** *for additional information regarding compliance with Section 404 of the Clean Water Act.*

242 ***See response to Comment number 165.***

243 *The effects of Wyoming water development on reservoir levels and streamflows are presented in* ***figures 4-5 through 4-12*** *and in* ***Appendix E of the EIS****. In developing this information, it was assumed that Wyoming would develop all water available to it under the terms of the Yellowstone Compact. With full Wyoming development, there generally would be enough water to fill the reservoir and allow for full use by existing irrigators and the Tribe. However, water shortages would occur during very dry years.*

244 *The project sponsors in no way intend to imply that any particular individual or group of individuals has intentionally degraded fish and wildlife habitats in the project area. Much of the degradation has occurred in the area around the reservoir. In response to your comment, the statement regarding the need for fish and wildlife habitat enhancement has been revised (****see Section 1.2 of the EIS****).*

245 ***See response to Comment number 233.***

246 ***See response to Comment number 245.***

247 ***See response to Comment number 233.***

248 *The project sponsors agree that there are several distinct differences between the proposed Tongue River Basin Project and the Animus La Plata Project in Colorado, not the least of which is the fact that the Tongue River Basin Project involves an existing dam. We also agree as to the importance of continued interaction with both EPA and COE in order to comply fully with Section 404 of the Clean Water Act. Since publication of the draft EIS, several meetings and conference calls with EPA and COE have taken place, and both agencies now have agreed to take part in the project as cooperating agencies. Together with EPA and COE, the project sponsors are confident that we will meet all provisions for Section 404 compliance.*

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APPENDIX A

APPLICABLE LAWS, REGULATIONS, AND AGENCY INVOLVEMENT

The following environmental laws and regulatory authorities are applicable to this project:

ENDANGERED SPECIES ACT

USBR prepares a biological assessment to determine project effects on threatened and endangered plant and animal species listed or proposed for listing (candidate species) under the Endangered Species Act (16 U.S.C., § 1531 et seq.). U.S. Fish and Wildlife Service (USFWS), then issues an opinion on whether federal actions are likely to jeopardize the continued existence of a threatened or endangered species, or destroy or adversely modify critical habitat. USFWS must approve the preparation of a biological assessment to comply with the Endangered Species Act in order to render its decision. If USFWS determines that the preferred alternative would jeopardize the continued existence of a species, it may offer a reasonable and prudent alternative that would preclude jeopardy.

LAWS AND REGULATIONS ADDRESSING CULTURAL RESOURCES

Because federal properties and funding are involved, a consideration of effects on cultural resources must be undertaken, as required under the following laws and regulations: the National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. § 470 et seq.); the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C., § 4321); the Archaeological Resources Protection Act (ARPA) of 1979 (16 U.S.C. § 470aa et seq.); the National Park Services (NPS) procedures concerning the National Register of Historic Places (NR) (36 CFR Part 60); the Advisory Council on Historic Preservation's Procedures for the Protection of Cultural Properties (36 CFR Part 800); the Treatment of Archaeological Properties of 1980; Determination of Eligibility for Inclusion in the NR (36 CFR 63); the Secretary of the Interior's Standards and Guidelines for Archaeological Historical Preservation of 1983; Reservoir Salvage Act of 1960; the 1974 Amendment to the Reservoir Salvage Act of 1960; and the Montana Antiquity Act of 1979 (MCA 22-3-424). In addition, consultation with relevant Native American groups concerning traditional cultural properties is required under the American Indian Religious Freedom Act of 1978 (AIRFA, P.L. 95-341, 42 U.S.C. § 1996) and Section 4 of ARPA of 1979. Guidelines for evaluation of traditional cultural properties are contained in Bulletin 38 issued by the National Park Service.

SECTION 404 OF THE CLEAN WATER ACT

Section 404 of the Clean Water Act (33 U.S.C. § 1344) authorizes U.S. Army Corps of Engineers (COE) to regulate activities that would place fill in wetlands and surface waters. The proposed project would fall under jurisdiction of the Corps of Engineers because fill would be placed in surface waters as a result of constructing a bridge across the Tongue River, downstream of the dam; constructing a coffer dam during the construction phase of the project; conducting construction activities below the normal high water line; and placing riprap to prevent erosion of embankments protecting Montana Highway 314 and Decker Mine facilities.

COE and the U.S. Environmental Protection Agency (EPA) have developed guidelines to evaluate impacts from dredged or fill disposal activities on Waters of the U.S. and to determine compliance with Section 404 of the Clean Water Act (33 CFR § 323 et seq; 40 CFR § 230 et seq.). The guidelines require analysis of "practicable" alternatives that would not require disposal of dredged or fill material in Waters of the U.S., or would result in less environmental damage. Under the guidelines, the term "practicable" means "available or capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes." EPA also reviews 404 permit applications and has veto power under the Clean Water Act for decisions made by COE on 404 permit applications.

FEDERAL LAND POLICY AND MANAGEMENT ACT

Under the Federal Land Policy and Management Act (43 U.S.C. § 1701 et seq.), a special use permit would be required from the U.S. Bureau of Land Management (BLM) for flood easements over BLM lands and if any new electrical transmission lines were required by the project.

MONTANA WATER USE ACT

DNRC administers the Montana Water Use Act (MCA 85-2). A water rights permit is required by the Act for any surface water diversion or ground water withdrawal exceeding 35 gallons per minute and with an annual volume of 10 acre-feet or more for any type of use prior to construction. Notice of Completion of the well must be filed with DNRC within 60 days. The water well driller must hold a license from the Board of Water Well Contractors.

MONTANA DAM SAFETY ACT

DNRC administers the 1985 Montana Dam Safety Act (MCA 85-15) which addresses high hazard dams. A high hazard dam is defined as any dam that impounds 50 acre-feet or more and could cause loss of life downstream if it failed. Tongue River Basin Project is classified as a high hazard project, although this is not necessarily a classification of the dam's condition.

Under the Act, an operating permit would be required to operate the Tongue River Basin Project from year to year. A construction permit would be required before any major repair, alteration, or enlargement could begin. The design and construction of repairs to the existing dam must meet minimum requirements outlined in ARM 36.14.101 through 36.14.803 adopted by DNRC.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

NEPA (42 U.S.C. § 4321 et seq.) requires adherence by federal agencies to regulations minimizing adverse environmental impacts on projects involving federal lands or funding. Reclamation has been designated as the lead federal agency for NEPA compliance related to this project.

MONTANA ENVIRONMENTAL POLICY ACT (MEPA)

MEPA (MCA 75-1-101 et seq.) requires adherence by state agencies to regulations minimizing adverse environmental impacts on projects involving state property or funding. DNRC has been designated as the lead agency for MEPA compliance related to this project.

Northern Cheyenne - Montana Water Rights Compact (Compact) and Northern Cheyenne Indian Reserved Water Rights Settlement Act

USBR has a trust responsibility to protect and maintain water rights reserved by or granted to Indian tribes or individuals by the Act. In conjunction with other participating agencies, DNRC implements the provisions of the Compact and provides for repairs and improvements of the state-owned Tongue River Dam.

MONTANA CLEAN AIR ACT

The Department of Environmental Quality (DEQ) administers the Montana Clean Air Act (MCA 75-2-101 et seq.). Any project having estimated pollutant emissions (without emission controls) exceeding 25 tons per year must obtain an air quality permit from the Air Quality Division. The permit would stipulate air emissions, limitations, and monitoring requirements. Best Available Control Technology must be applied to each emission source and it must be demonstrated that the project would not violate state or federal Ambient Air Quality Standards.

MONTANA WATER QUALITY ACT

The DEQ Water Quality Division (WQD) administers the Water Quality Act (MCA 75-5-101 et seq.). This law sets forth classification of surface and ground water uses and establishes water quality standards. The WQD administers the Montana Pollutant Discharge Elimination System (MPDES) permit system, including storm water permits and nondegradation waivers. A short-term exemption (3A authorization) from Surface Water Quality Standards for turbidity may be required for dam construction and related facility stream crossings.

EPA has oversight responsibility for federal Clean Water Act programs delegated to and administered by the State Water Quality Division. EPA also may intervene to resolve interstate disputes where discharges of pollutants in an upstream state may affect water quality in a downstream state.

MONTANA HAZARDOUS WASTE ACT

The DEQ Solid and Hazardous Waste Division is responsible for reviewing construction procedures and power line installation to ensure compliance with solid and hazardous waste laws and regulations (MCA 75-10).

MONTANA SOLID WASTE MANAGEMENT ACT

The waste area for disposal of construction waste materials would have to be permitted, opened for use, and closed under criteria established by DEQ for a Class III landfill (MCA 75-10).

MONTANA STREAM PRESERVATION ACT

Construction activity by a public agency that would include the construction of new facilities or modifications, operation and maintenance of an existing facility that may affect the natural shape and form of any stream, or its banks or tributaries would require a Stream Preservation Act (SPA 124) permit. The purpose of this permit is to protect fish and wildlife resources and to maintain streams and rivers in their natural or existing state. This permit is administered by Montana Department of Fish, Wildlife and Parks and a Notice of Construction application would be required before construction on the Tongue River Basin Project could begin.

OPEN CUT MINING PERMIT

Development of aggregate source sites No. 1 and No. 2 would require agreements with, and the necessary open cut mining permit from, DEQ. No mining would be allowed until entering into a reclamation contract with the Board of Land Commissioners.

MONTANA FLOODPLAIN AND FLOODWAY MANAGEMENT ACT

A Floodplain Development Permit would be required for new construction in a designated 100-year floodplain from DNRC. New construction includes the placement of fill, roads, bridges, culverts, power lines, storage of equipment or materials, or excavation within a designated 100-year floodplain. The 100-year floodplain on the Tongue River Basin within Big Horn County has been delineated and the county is participating in the National Flood Insurance Program. Floodplain development permits are administered by the local county floodplain administrator and a permit would be required before construction on the Tongue River Basin Project could begin.

FISH AND WILDLIFE COORDINATION ACT

U.S. Fish and Wildlife Service conducts a study under the Act and makes recommendations to federal agencies to mitigate fish and wildlife impacts associated with project activities.

NOXIOUS WEED CONTROL ACT

Montana's county Noxious Weed Control Act requires that disturbed areas (in this case related to the Tongue River Basin Project) be seeded, planted, or otherwise managed to reestablish a cover of beneficial plants. DNRC must submit a written weed control plan to the appropriate County Weed Boards specifying the methods to be used to accomplish revegetation and weed management procedures to be used. The plan is subject to approval by the weed control boards, which may require modifications to bring it into compliance with county weed management plans.

Appendix B

BIOLOGICAL ASSESSMENT

Tongue River Basin Project

Prepared by
Mark Albers
United States Bureau of Reclamation
May 1995

PROJECT DESCRIPTION

The Tongue River Basin Project is a result of the "Northern Cheyenne Indian Reserved Water Rights Settlement Act of 1992" (P.L. 102-374, 106, Stat. 1186). The major elements of the project include repairing and enlarging the Tongue River Dam and implementing various fish and wildlife habitat enhancement projects in the Tongue River Basin.

To address the elements listed above the United States Bureau of Reclamation, the Northern Cheyenne Tribe, and the Montana Department of Natural Resources and Conservation (Project Sponsors) are analyzing two construction alternatives, a no-action alternative, and a programmatic list of enhancement features. The enhancement features will be implemented in conjunction with either construction alternative. Each of the construction alternatives involves replacing the existing spillway and raising the crest elevation an additional 4 feet.

AFFECTED AREA

The Tongue River flows approximately 100 miles from its headwaters in Wyoming's Bighorn Mountains to Montana's Tongue River Dam, which is located a few miles north of the Wyoming border and 189 river-miles southwest of the Tongue's mouth on the Yellowstone River at Miles City (Figure 1). The Tongue River Dam, owned by the State of Montana, was completed in 1940. It is administered by DNRC and the Tongue River Water Users Association.

The existing Tongue River Reservoir is impounded by a 91-foot-high dam and occupies a section of the Tongue River Valley wider and flatter than the sections immediately above and below the reservoir. The Fort Union formation dominates the surface geology. This formation consists of soft, silty, sandstone, clay shales, and coal beds. Porcellanite and clinker, caused by burned coal deposits, have formed in adjacent shale beds.

Water development projects constructed in the basin since the turn of the century have significantly altered the seasonal hydrograph, sediment transport mechanisms, temperature regime, and morphology of the Tongue River. Additionally, many of these projects represent total or partial barriers to fish passage in the river.

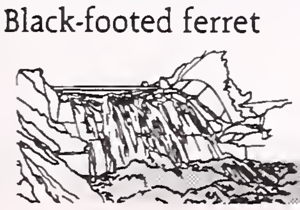
The most significant impacts to terrestrial habitats will occur in the immediate vicinity of the Tongue River Reservoir. Aquatic habitat impacts are also expected to be greatest at the reservoir site and the upper reaches of the river, but may potentially extend downstream to the mouth.

FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES

Federally listed Threatened and Endangered (T&E) species and Category 1 and 2 Candidate species of fish, birds, herps or plants that may occur on or near the project area, or which may potentially be affected by the project, are listed below. Six species have been designated as T&E under the Endangered Species Act of 1973, and as amended. An additional 22 species are designated as Category 1 and 2 Candidate species.

Threatened and Endangered Species

Bald eagle	*Haliaeetus leucocephalus*	Endangered
Peregrine falcon	*Falco peregrinus*	Endangered
Piping plover	*Charadrius melodus*	Threatened
Least tern	*Sterna antillarum*	Endangered
Pallid sturgeon	*Scaphirhynchus albus*	Endangered
Black-footed ferret	*Mustela nigripes*	Endangered



Category 1 Candidate Species

Category 1 indicates taxa for which the United States Fish and Wildlife Service (Service) has on file sufficient information on biological vulnerability and threats to support proposals to list as threatened and endangered.

Mountain plover	*Charadrius montanus*
Sturgeon chub	*Macrhybopsis gelida*
Sicklefin chub	*Macrhybopsis meeki*

Category 2 Candidate Species

Category 2 indicates taxa for which the Service has information indicating that proposing to list is possibly appropriate but for which conclusive data on biological vulnerability and threat currently are not available to support a proposal to list.

Spotted bat	*Euderma maculatum*
Small-footed myotis	*Myotis cilioabrum*
Long-eared myotis	*Myotis evotis*
Long-legged myotis	*Myotis volans*
Pale Townsend's big-eared bat	*Plecotus townsendii pallescens*
Swift fox	*Vulpes velox*
Northern Goshawk	*Accipiter gentilis*
Baird's sparrow	*Ammodramus bairdii*
Western burrowing owl	*Athene cunicularia hypugea*
Ferruginous hawk	*Buteo regalis*
Black tern	*Childonias niger*
Eastern short-horned lizard	*Phrynosoma douglasii brevirostra*
Northern sagebrush lizard	*Sceloporus graciosus graciosus*
Blue sucker	*Cycleptus elongatus*
Western silvery minnow	*Hybognathus argyritis*
Plains minnow	*Hybognathus placitus*
Flathead chub	*Platygobio gracilis*
Paddlefish	*Polydon spathula*
Persistentsepal yellowcress	*Rorrippa calycina*

HABITAT USE AND STATUS OF SPECIES

Threatened and Endangered Species

Bald Eagle

The bald eagle occurs in the project area as a seasonal migrant as well as a wintering and breeding species. Coal company biologists in the vicinity have informally monitored bald eagle wintering populations over part of the area for a period of years. Although formal winter counts over the entire river (Wyoming state line to Miles City) have not been conducted an estimated annual average of 10 eagles may winter along the river below the dam (J. Berry pers. comm. 1992). M. Humphris (pers. comm. 1992) suggests that an average of 10 to 15 eagles may use this river reach in the winter, concentrated mostly in the canyon just below the dam. A late winter count conducted on February 20, 1992 by a biologist under contract to a consulting firm revealed a total of 50 bald eagles along Tongue River between its mouth at Miles City and the upper end of Tongue River Reservoir (P. Farmer, Westech, pers. comm. 1992). According to one expert, this count probably reflects an influx of spring migrating eagles (D. Flath, MDFWP pers. comm. 1992). Although specific data are apparently lacking, a number of biologists have previously indicated the impression that the Tongue River may be an important seasonal migration corridor for bald eagles.

Bald eagles have also been seen consistently, but in small numbers, on Tongue River Reservoir, especially in late spring after most of the ice is out (J. Berry, pers. comm. 1992). These may represent birds that wintered on the river below the dam and some seasonal migrants.

During 1983-84, apparent pair-bonding activity by a pair of bald eagles was observed near a tree nest site near the Tongue River, approximately 2.5 miles downstream of the dam. No egg-laying occurred and the nest was subsequently reported to be used by nesting golden eagles (D. Flath, MDFWP, pers. comm. 1992). In spring 1992 a pair of bald eagles established a nest in a cottonwood tree about eight miles downstream from the dam. In the past few years this nest and another in the same area were apparently used interchangeably by the same pair of bald eagles (Dennis Flath, MDFWP, pers. comm. 1992). In spring 1994 one of the nests was occupied by bald eagles but was destroyed in a windstorm; the other nest was not occupied. In spring 1995 a pair of bald eagles established a new nest in a cottonwood in an old heron rookery approximately 2.5 miles downstream from the dam. Bald eagles have also successfully nested along the Tongue River upstream from the Tongue River Reservoir (Phillips et al. 1990) and downstream between Ashland and Miles City (ICC 1992). Both these nests are also in cottonwood trees.

Peregrine Falcon

No peregrine falcon nesting territories are known to exist near enough to the project area to be of concern. Although the falcon has been sighted in the general area (Martin et al. 1981) (Decker 1990), it is assumed to be a migrant only, although at least marginally suitable nesting habitat exists in Tongue River Canyon below the dam. The MDFWP has indicated that more suitable nesting habitat is widely available in Montana and that until the species becomes more common, it appears unlikely that it would nest in this area (D. Flath, MDFWP, pers. comm. 1992). The most important consideration for assuring that the project does not potentially affect this species is to adequately provide for maintenance of suitable stream flows both after and during the roughly two-year period of project construction since the relatively high seasonal use by waterfowl of the upper reaches of Tongue River below the dam is likely to provide an important source of food for migrating peregrine falcons.

Piping Plover and Least Tern

Both the piping plover and least tern likely occur in the project area at times as seasonal migrants. However, neither species was identified by Martin et al. (1981), and discussions with a variety of biologists experienced in the general area failed to uncover any historic sightings. Nesting plovers and terns do occur in the state; a total of 89 piping plover nests and 42 least tern nests were reported in Montana in 1990 (Montana Piping Plover Committee 1991). Most of these nest sites occurred in northeastern Montana, but limited historic nesting by terns and plovers was reported on Yellowstone River sand or gravel bars, near Terry, downstream of the mouth of Tongue River.

In an effort to determine whether there is any likelihood that plover or tern nesting might be occurring or be likely to occur on the Tongue River, the evaluation team for the 1992 Tongue River Dam Project Fish and Wildlife Coordination Act Report (CAR) took two actions: (1) during field inspections in the spring and early summer of 1991, an evaluation was made of the suitability of nesting habitat for these species; and (2) several other biologists familiar with the area were consulted for their opinions concerning potential nesting.

Neither Tongue River nor the reservoir appear to offer habitat physically suitable for piping plover or least tern nesting. Most known piping plover nesting in Montana occurs on barren flats of saline or otherwise unvegetated beaches of lakes and wetlands in northeastern Montana. Some, however, occurs on wide beaches of Fort Peck Reservoir when the impoundment is low, and on rather extensive unvegetated sand bars, islands and wider beaches of the lower Missouri and Yellowstone rivers. Tern nesting is even less common and is largely confined to the same river habitats as discussed for the plover. Tongue River, however, is largely confined within incised "cutbanks"; substrate is exposed only during low water periods. Beaches and islands tend to be very narrow and subject to frequent inundation. In the reach just below the dam, fairly large cobble prevails; over much of the river the bars are quite muddy or silty. Vegetation grows very near the waterline in most areas and quickly invades the small islands and bars that become available.

Most beaches in the lower part of the reservoir are quite narrow and steep and much of the available substrate is silty or muddy. The more exposed areas at the upper end of the reservoir are quite silty and muddy. Many have been extensively invaded by vegetation. While it may be possible that this reservoir could be used to a very limited extent by either plovers or terns, this appears unlikely, given the physical characteristics of the habitat and the reservoir's location in relation to most known plover/tern occurrences in the state.

These observations agree with the opinions expressed by other wildlife biologists experienced in the Tongue River area (D. Bricco and C. Hoff, BLM, pers. comm. 1992) (B. Giddings and A. Dood, MDFWP, pers. comm. 1992).

Pallid Sturgeon

The historic occurrence of the pallid sturgeon in Montana is known to have included the Yellowstone River at least as far upstream as the mouth of Tongue River. Many of the documented historic sightings of the pallid sturgeon in the Yellowstone River contained in a recent USFWS status report on this species (USFWS 1989) occurred at the mouth of the Tongue or very nearby in the Yellowstone. The last documented sighting in this area prior to a 1991 survey by MDFWP was, however, in 1950. Recorded occurrences of the sturgeon in the Yellowstone drainage since the 1970s had all been from below the Intake Diversion Dam, an irrigation diversion facility located some 120 miles downstream from the Tongue. Within recent years, the few confirmed sightings in the Yellowstone had all occurred near the mouth of the Yellowstone, until two catches by fishermen at Intake in the spring of 1991. Those fish, observed and tagged by representatives of the MDFWP, were released below the point of capture (P. Stewart, MDFWP, pers. comm. 1991).

It is suspected that the lack of recorded occurrences of pallid sturgeon in the Yellowstone River above Intake since 1950 is a function of the lack of specific effort to find them, combined with their obvious rarity, rather than their total extirpation from the river reach. In addition, fishery experts have stated that the aquatic habitat at the mouth of the Tongue, and of the Yellowstone River in the immediate vicinity, appears to be physically well suited to what is known of the pallid sturgeon's life history requirements (M. Dwyer, USFWS; pers. comm. 1991). High seasonal concentrations of the much smaller, but closely related, shovelnose sturgeon (*Scaphirhynchus platorhynchus*) have also been reported from this same location. This fish apparently congregates near the mouth of the Tongue River in spring months, then migrates up the Tongue to spawn when water conditions permit (Elser et al. 1977). Since the pallid sturgeon and shovelnose are closely related and have been known to hybridize (USFWS 1989), and their seasonal distributions have been widely known to overlap, it appears the known data support the opinion expressed by experts that the mouth of the Tongue River and adjacent reach of the Yellowstone continue to provide habitat suitable for pallid sturgeon. These experts have indicated informally that this area may offer some of the more promising habitat for eventual reintroduction of the pallid sturgeon into its former range, if that is determined to be a viable recovery option (M. Dryer, USFWS; pers. comm. 1991).

For the above reasons, the evaluation team constituted by the USFWS to prepare the CAR recommended that a survey be conducted for pallid sturgeon at the mouth of the Tongue River and in the Yellowstone, as part of the Tongue River Dam Rehabilitation Special Study. It was considered necessary to establish with as much certainty as possible whether or not the species still existed in the habitat considered suitable, as part of the baseline data for any assessment of potential affects of the project on the species. Subsequently, a contract between the USBR and MDFWP was executed providing for MDFWP to conduct a rather intensive survey during the spring-early summer of 1991. On the further recommendation of MDFWP fishery specialists, the contracted study area was broadened from the original proposal to include the Yellowstone River from Intake Dam to the Cartersville Diversion Dam, located some 40 miles upstream from Miles City, and the lowermost reaches of the Tongue and Powder rivers. The Cartersville structure is considered likely to be a total block to any pallid sturgeon migrating past the Intake Diversion (P. Stewart, MDFWP, pers. comm.).

The pallid sturgeon survey was conducted from April to August 1991 (Watson and Stewart, 1991). A single pallid sturgeon was captured in a trammel net in the study reach, on July 18, near Fallon, Montana (River km 208.2). The fish was caught on the upstream side of a submerged gravel bar, in three to five feet of water. The specimen weighed 11.34 kg and had a fork length of 1,340 mm. It was disk tagged and released.

Capture of this single specimen demonstrates that the pallid sturgeon has not been extirpated from the Yellowstone River above Intake Diversion and may still reach the mouth of Tongue River. The taking in 1991 of two additional specimens from the Yellowstone just below Intake Diversion by fishermen, as described earlier, may indicate that fair numbers of this species still migrate to and possibly around the diversion structure, at least in years of moderate-to-high spring and summer runoff. These data, and the opinions of experts on the species that the mouth of Tongue River and adjacent reach of the Yellowstone provide good physical habitat for the sturgeon, suggest it may be important to the species to assure that this habitat is not adversely impacted by the proposed project.

Black-footed Ferret

Prairie dog (Cynomys sp.) towns are considered potential habitat for black-footed ferrets. The evaluation team for the CAR made an effort to determine whether prairie dog complexes existed that would be impacted by the proposed project. In addition, a professional wildlife biologist thoroughly familiar with the southern end of the reservoir

area was consulted with regard to probable occurrence of prairie dogs below elevation 3,428.4 feet, the anticipated normal full pool of the enlarged reservoir. He knew of no such occurrences within his area of familiarity and doubted these would exist in light of the terrain over much of the reservoir's periphery (J. Berry, pers. comm. 1991).

A small, probably isolated, black-tailed prairie dog town located on the east side of the reservoir, in Section 1, Township 9 South, Range 40 East, near the intermittent Deer Creek drainage, might conceivably be impacted by the proposed reservoir pool. This town is located approximately .5 miles north of the East Decker Coal Mine facilities.

Black-tailed prairie dogs and their burrows are fairly abundant in downstream areas that have not been affected by the sylvatic plague. All activities associated with this project in the lower basin will be fish and wildlife habitat enhancement measures. Each of these measures will be reviewed for potential impacts to prairie dog complexes prior to the implementation of the measure.

Survey guidelines are provided by the Service in a document entitled, "Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act, U.S. Fish and Wildlife Service, April 1989".

Category 1 Candidate Species

Mountain Plover

Mountain plovers are known mostly from northcentral and eastern Montana (Olson-Edge and Edge 1987; Taylor 1988) where they are associated with semi-arid grasslands, shortgrass prairie, plains and plateaus (Taylor 1988). Nesting mountain plovers prefer shortgrass prairie areas that are flat, moderately grazed, and provide short vegetation, hence most significant populations remaining in the northern region nest preferentially in prairie dog towns (Knowles et al., 1982; Olson, 1984). Suitable habitat in the project area is limited by topography and agricultural practices. Mountain plovers have not been documented in the project area (Bergeron, et al 1992; Dobkin, D.S. 1992)

Sturgeon Chub

Documentation indicates that sturgeon chub were locally abundant at some historic collection sites. Sturgeon chub are currently extremely uncommon or absent from 23 of 27 streams within their historic range. Sturgeon chub were documented in the lower reach of the Tongue River upstream of Miles City in 1926 (Bailey & Allum 1962) and again in 1980 (Elser et al. 1980). This population has since been listed as "assumed extirpated" on the basis of unsuccessful field collection attempts in 1989 and 1990 (Werdon 1992).

Sturgeon chub require turbid, free-flowing riverine habitat with a combination of rock, gravel, and/or sand substrate. They are found in greatest abundance in gravel riffles (Stewart 1981; Werdon 1992). As described under the "Affected Area" heading above, suitable habitat for the sturgeon chub has been greatly reduced or eliminated in the Tongue River in Montana. The earliest documentation of sturgeon chub in the Tongue River occurred after construction of the Tongue and Yellowstone (T&Y) Diversion Dam, 12 miles upstream from the mouth. The T&Y Dam is a complete blockage to upstream fish passage. It is not known if sturgeon chub historically utilized river reaches above T&Y.

The introduction of numerous exotic piscivorous (fish eating) species into systems such as the Tongue and Yellowstone Rivers may have had a profound effect on some of the native species.

Sicklefin Chub

Sicklefin chub share the same basic habitat requirements and apparent preferences as sturgeon chub. Sicklefin chub were not historically documented in the Tongue River. However, based on their association with sturgeon chub, it is reasonable to assume that suitable habitat may have existed in the Tongue River prior to the water development projects. A researcher presenting a paper at the February 1995 meeting of the Montana Chapter of the American Fisheries Society postulated that low perceived numbers of this species are due to collection techniques and not actual population depletions (Grisek, AFS Meeting 1995). In research conducted toward for his masters thesis, Grisek found that shallow-water seining for sickle fin chub was not an effective means of population sampling. Using a trawl to sample deep-water habitat adjacent to areas unsuccessfully beach seined in the Missouri River, Grisek repeatedly collected and documented sicklefin chub.

Category 2 Candidate Species

Information on distribution and occurrence of many of the Category 2 candidate species is limited or nonexistent. Listed below are all Category 2 species which may occur in the project vicinity or for which suitable habitat may be available in the project area.

Spotted Bat

The global status of the spotted bat is apparently widespread but rarely abundant (Montana Natural Heritage Program 1995). In Montana there have been a few documented sightings in the south-central part of the state. Spotted bats are found in various habitats from desert to montane coniferous forest, including open ponderosa pine, pinyon-juniper woodland, open pasture, and hayfields. In British Columbia, the species forages mainly in fields near pines and over marshes (Wai-Ping and Fenton 1989). In northwestern Colorado, the species is cited as locally common in pinyon-juniper woodland, riparian corridors, and over rivers (Navo et al. 1992) The spotted bat roosts in caves and in cracks and crevices in cliffs and canyons. Presumably, suitable habitat for this species exists throughout the project area, but its presence there has not been documented.

Small-footed Myotis

The small-footed myotis occurs in most of Montana, with the possibly exception of extreme northwestern and northcentral parts of the state. It is thought to be more widespread than current documentation would suggest (Hoffman et al. 1969; Thompson 1982). In general, the species utilizes arid habitat associated with cliffs and talus slopes. In Texas, the small-footed myotis has principally been documented in mountainous wooded areas, with a few taken in grassland and desert scrub habitats (Scmidly 1991). In Canada, the species inhabits arid short-grass prairies with clay buttes and steep riverbanks. In summer, the species roosts in rock crevices, under boulders, beneath loose bark, or in buildings. The species hibernates in caves or mines. This species was documented approximately 3 miles west of the reservoir on the Spring Creek Coal Mine in 1976 (B. Lovelace, DSL; pers. comm. 1995).

Long-eared Myotis

The long-eared myotis is widespread within Montana and probably found throughout the state. It appears to be most common in coniferous forests (Hoffman and Pattie 1968; Jones et al. 1973). In general the species is found mostly near forested areas, especially those with broken rock outcrops; also shrubland, over meadows near tall timber, along wooded streams, and over reservoirs. It often roosts in hollow trees, mines, caves, fissures, etc. In Montana, the long-eared myotis is found in wooded and rocky areas (Jones et al. 1973). It has been located hibernating in a mine in riverbreaks habitat in northeastern Montana. This species was documented approximately 3 miles west of the reservoir on the Spring Creek Coal Mine in 1976 (B. Lovelace, DSL; pers. comm. 1995).

Long-legged Myotis

The long-legged myotis is very common and widespread in parts of its range. In Montana, it occurs in wide range of elevations and is probably found throughout the state (Hoffmann, Pattie and Bell 1969). In general, the species is primarily found in montane coniferous forests at 2000-3000m; also riparian and desert habitats. The species may change its habits seasonally. It uses caves and mines as hibernacula, but its winter habits are poorly known. In summer, it roosts in abandoned buildings, rock crevices, and under loose bark, but apparently not in caves. No specific habitat-use information is available for this species in Montana. This species has been located hibernating in an abandoned mine in northeastern Montana. This species was documented approximately 3 miles west of the reservoir on the Spring Creek Coal Mine in 1976 (B. Lovelace, DSL; pers. comm. 1995).

Pale Townsend's Big-eared Bat

Pale Townsend's big-eared bat is fairly common in the west, but two eastern subspecies are listed as endangered by the U.S. Fish and Wildlife Service (44 FR 69208, 30 November 1979). Scattered records imply that the species is widespread in Montana. In Montana, the species is generally found in low population densities, occupying a range of habitats including moist forests (Thomas and West 1991) as well as arid regions (Genter and Metzgar 1985). In western Montana, they are most closely associated with cavernous habitat and rocky outcrops of sedimentary or limestone origin, which are used for roosting. Individuals are occasionally found in buildings. A major maternity colony for this species is located in the state-owned Lewis and Clark Caverns. A nursery colony was located in Lake county in 1992. Secure roosting habitat is probably the limiting factor for this species in Montana. Threats to this habitat includes reclamation of abandoned mines, cave/mine exploration and vandalism, and seismic activity and road building (Twente 1955; Humphrey and Kunz 1976; Genter 1989; Madsen et al. 1993). This species was documented approximately 3 miles west of the reservoir on the Spring Creek Coal Mine in 1976 (B. Lovelace, DSL; pers. comm. 1995).

Swift Fox

The swift fox is believed to originally have been abundant throughout its range on the Great Plains, including

Montana east of the continental divide. It was extirpated early in this century from the northern portion of its range while remnant populations in the southern portion survived human settlement of the prairies. The loss of the swift fox over such a broad area prior to the advent of quantitative ecological studies has resulted in a paucity of ecological information on this species. Virtually nothing is known about the swift fox in Montana (FaunaWest 1991). Although no quantitative analysis of swift fox habitat selection has been undertaken, numerous studies indicate that swift foxes use, and prefer, short to mid-grass prairies (Cutter 1958a; Kilgore 1969; Hillman and Sharps 1978; Hines 1980; Fitzgerald et al. 1983). Prairie habitats dominated by buffalo grass or blue grama grass appear to be the areas where the highest densities of swift foxes are found in the southern portion of their range (Kilgore 1969; Hillman and Sharps 1978; Fitzgerald et al. 1983). The swift fox is known to inhabit areas of mixed agricultural use, but in lower densities.

A single swift fox was documented in Custer county in the lower portion of the project area in 1978. No other recent sightings of the species have been made in the project area. Suitable habitat for the swift fox is somewhat limited in the project area. The riparian area of the Tongue River Basin appears to be better suited to the red fox.

Northern Goshawk

The northern goshawk is closely associated with coniferous or mostly coniferous forest and open woodlands with significant old-growth components. Nests occurs in large old-growth conifers or sometimes in aspens, especially near water (Dobkin 1992). The northern goshawk is considered a permanent resident across most of Montana. The species is known to breed in the project area (Bergeron et al. 1992). These sightings are assumed to be from the coniferous forests of the Custer National Forest on the eastern edge of the project area.

Baird's Sparrow

Baird's sparrow is a shortgrass prairie specialist endemic to the northern Great Plains. To a lesser extent the species will also use mixed tallgrass - shortgrass prairie, alfalfa fields, weedy stubble fields, and retired cropland. The species nests on the ground in slight depressions, usually well concealed by overhanging vegetation. Loss of suitable native prairie due to grazing and agricultural conversion have caused inexorable decline in Baird's sparrow populations throughout its range. The species has not been documented in the project area (Bergeron et al. 1992, Dobkin 1992) although marginal habitat may be present.

Western Burrowing Owl

The western burrowing owl inhabits prairie, grassland, meadow and open shrub steppe, but does not use structurally-similar montane habitats. The species nests in abandoned mammal (usually ground squirrel or prairie dog) burrows. Numbers are small but relatively stable in Idaho and North Dakota, although populations continue to exhibit long-term declines in Montana (Dobkins 1992). As a result of control measures that have reduced populations of colonial rodents, and as prairie and plains habitats have been converted to agriculture, burrowing owls have been reduced greatly, as well. The species is known to breed in the project area (Bergeron et al. 1992).

Ferruginous Hawk

The ferruginous hawk requires dry open country, especially native prairies, but also uses shrubsteppe, plains, and badlands. Preferred nest sites east of the continental divide in Montana are in deciduous trees, but the species also nests on cliff ledges, atop rock out crops, in deciduous shrubs, on elevated ground, and on human built structures, including haystacks (Dobkin 1992, Wittenhagen 1992). The species at times inhabits the project area and may breed there, but definitive documentation of breeding is not available (Bergeron et al. 1992). Ferruginous hawk numbers have significantly increased in Montana, slightly in North Dakota, and decreased somewhat in Idaho. Populations appear to be stable overall following marked declines in many areas beginning in the late 1940s, although the species is still uncommon in many parts of its breeding range. Loss of suitable habitat to agricultural conversion and overgrazing by livestock are the primary problems facing the species (Dobkin 1992).

Black Tern

The black tern has been sighted in the project area, but breeding activity has not been observed (Bergeron et al. 1992). The species does breed in Montana, mainly in the western part of the state and, to a lesser extent, in the north. The black tern nests in dense emergent vegetation with the eggs often just above the water. Historic operations of Tongue River Reservoir have not been conducive to black tern nesting. The seasonally fluctuating water levels do not provide suitable nesting habitat. Other wetlands in the project area may provide marginally suitable nesting habitat. The black tern is thought to be declining in many areas due largely to the loss of wetland habitat. Greatly reduced hatching success in the upper midwest may be due to contamination with agricultural chemicals.

Short-horned Lizard

The short-horned lizard ranges from semiarid plains to high mountains. Usually occupying areas with sparse vegetation at ground level. Soil in habitat areas may vary from sandy to rocky. The species burrows into the soil or occupies rodent burrows when inactive. In southeastern Idaho the species uses sagebrush habitats the most, with females and juveniles often associated with roadsides (Guyer 1978). In southeastern Alberta the species used more habitats as the temperature increased (Powell and Russell 1985). Large amounts of presumably suitable habitat exist for this species in the project area. This species was documented in the project area in a 1981 MDFWP survey (Martin et al. 1981).

Northern Sagebrush Lizard

In southeastern Idaho, the northern sagebrush lizard prefers sage habitats (Guyer 1978). In southeast Oregon the species is observed most often in alkaline flats, basalt outcroppings, and sage. In northeast Wyoming, the species occurs on pale sandy alluvium or soil supporting big sage, rabbit brush, and greasewood. Although no specific habitat-preference data is available for Montana, conditions on the uplands in the project area closely approximate those described as preferred habitat in Wyoming. The species uses rodent burrows for overnight refuge, escape, and hibernation. The species has been documented in the project area and should be considered common in the reservoir area (B. Lovelace, DSL, pers. comm. 1995).

Blue Sucker

Blue suckers occur in the same habitats as pallid sturgeon, sicklefin chub, and sturgeon chub: turbid, free-flowing river areas. Like these associated species, the blue sucker was likely impacted by water development projects throughout its range. The blue sucker appears to be fairly abundant in the Lower Missouri and Yellowstone drainages in Montana (Gardner MDFWP, AFS Meeting 1995). The blue sucker occurs in the project area but little is known about population densities and habitat selection.

Western Silvery Minnow

The western silvery minnow occurs most commonly in the Missouri River and its larger tributaries of the prairie region. This minnow is decidedly less abundant than the closely related plains minnow in the western part of its range (Pflieger 1975). The western silvery minnow is most abundant in the low-gradient sections of clear, moderately large streams. However, it can tolerate high turbidity better than some related species. It is generally found over a silt or sand bottom in the backwaters and pools of large streams and in the quiet lower reaches of their tributaries (Pflieger 1975). The species apparently has not been documented in the project area. However, the collection of the closely related plains minnow as described below may indicate that suitable habitat exists in the project area.

Plains Minnow

The plains minnow was been documented in the project area during an electrofishing survey in 1993. One specimen was sampled in the midreach of the river (Backes 1993). The species was not documented in an earlier survey of the same area (Clancy 1980). The plains minnow is the most abundant minnow in the upper Missouri River but undergoes a gradual decline in abundance downstream (Pflieger 1975). Habitat requirements or preferences for this species are very similar to those of the western silvery minnow.

Flathead Chub

Pflieger (1975) described the flathead chub as one of the most abundant minnows in the Missouri and lower Mississippi rivers. This species inhabits a diverse range of habitats, including continuously turbid waters with swift current and sand and fine gravel bottom to moderately clear waters with little current, and bottoms composed of coarse gravel and bedrock. This species has been documented in the project area and is often found in association with sturgeon chub and sicklefin chub.

Paddlefish

The original habitat of the paddlefish consisted of large free-flowing rivers with high concentrations of zooplankton. Populations of paddlefish are maintained in reservoirs where the fish have access to spawning areas consisting of deep rocky rapids with swift currents (Pflieger 1975). During high-flow years in the Lower Yellowstone River, paddlefish are known to migrate, in large numbers at times, past the Intake Diversion Dam. A small portion of these fish move upstream past the mouth of the Tongue River to Forsyth (Stewart per comm. 1995). It is reasonable to assume that during high flow years some of these fish may occupy the lower reach of the Tongue River below the T&Y Diversion Dam. Potential use by this

species would probably be concentrated near the mouth of the river. However, no documentation of such use is available.

Persistentsepal Yellowcress

Persistentsepal yellowcress is a regional endemic known from Wyoming, northwestern Nebraska, North Dakota, and Montana (Cascade, Choteau, Custer, McCone, and possibly Yellowstone counties). This species of yellowcress is mainly associated with pioneer riparian species including noxious weeds. Persistentsepal yellowcress is found at the base of slopes within riparian or palustrine habitat that is temporarily flooded; a narrow zone marking old shorelines of rivers, ponds, and lakes. The very low number of specimens collected or documented has lead to its being listed as extremely rare in Montana. In Wyoming, the construction of reservoirs has provided an unusual increase in potential habitat for this species (Rollins 1993). There is no basis for addressing potential threats to the species in Montana (Heidel 1994).

METHODS

Information collection and compilation for this Biological Assessment began formally in 1991 with the initiation of the Fish and Wildlife Coordination Act Report (CAR) for the Tongue River Dam Project and has continued to the present. Information collection methods included the review of existing literature, and contact with knowledgeable individuals.

The T&E species addressed in this document were selected from the September 1994 list of Threatened and Endangered Species - Montana. The candidate species were selected, on the basis of potential occurrence in the project area, from the Montana Animal and Plant Candidates for Listing Under the Endangered Species Act.

There was little available published literature (technical reports or other publications) pertaining specifically to the project area. Therefore, when available, information was cited for areas thought to contain analogous habitat types or conditions.

The Montana Natural Heritage Program provided a computer generated listing of T&E and candidate species documented in the project area. Additionally, they provided life history and distribution information for many of the species assessed.

Contacts with knowledgeable individuals included discussions with landowners, personnel from USFWS, MDFWP, MDNRC, BLM, FS, DSL and mining companies at various dates from 1991 through 1995. All personal communications cited in this Biological Assessment were included in the text.

A further discussion of assessment and documentation efforts for the T&E species can be found in the CAR.

EFFECTS OF THE PROPOSED ACTION

As delineated in the Project Description section, both construction alternatives involve a 4-foot raise of the spillway crest, as well as the institution of a number of fish and wildlife enhancement measures. Therefore, with some minor differences attributable to construction techniques, the effects on T&E and candidate species are judged to be identical. Major effects include the following:

(1) Approximately 541 acres of woody and herbaceous riparian wildlife habitat and wetlands are estimated to be lost with construction of the project (Miles and Hansen 1992).

(2) Approximately 139 acres of grassland and 25 acres of scrub forest wildlife habitats are estimated to be lost.

(3) Included in the potential losses are approximately 314 acres of existing wetland habitat .

(4) No long term (i.e., beyond several years) adverse impacts to aquatic resources are anticipated, based on construction and operating scenarios provided for this analysis. However, shorter-term impacts (construction period and a few years afterwards) are expected to be rather severe due to reservoir drawdown and seasonally reduced streamflows below the dam during approximately a 2-year construction period.

Anticipated beneficial effects associated with the implementation of fish and wildlife habitat enhancement features are:

(1) Restoration of degraded riparian habitats

(2) Restoration/preservation of native short-grass prairie habitat

(3) Decrease in habitat fragmentation in the project area

(4) Provision of instream flows during critical periods

DIRECT AND INDIRECT IMPACTS OF PROPOSED ACTION

THREATENED AND ENDANGERED SPECIES

Bald Eagle

Potential adverse impacts

Impacts to the bald eagle include displacement during construction from the area immediately downstream from the dam. This area contains suitable roosting, hunting, and fishing sites. Displacement from this site would not be considered a significant impact to the species, due the amount of suitable habitat extending several miles downstream of the dam. However, if this upstream area provided the only open water during a cold-weather event, effects on the bald eagle would be greater. It is recognized that sufficient open water to attract waterfowl and allow fishing is a very important factor for eagles wintering in the area.

Accidental discharge of toxic chemicals or petroleum products into or near the waterway, if released in sufficient quantity, could cause direct mortalities of this species or indirectly impact them by reducing fish and waterfowl abundance.

If new aerial powerlines are required during construction or for subsequent dam operations, these lines could cause direct mortalities from eagles colliding with the lines or being electrocuted.

Increased vehicular activity during the construction period could result in a larger number of road killed big game. Bald eagles foraging on the increased carrion source would be potential victims of vehicular collision.

Short-term increases of turbidity in the river resulting from construction activities could reduce fishing success or opportunity for the eagles.

Increased traffic near the active nest 2.5 miles downstream of the dam during the late winter to mid-summer nesting fledging period could disturb the eagles and result in nest abandonment. The proximity of the nest to the county road greatly elevates the risk of disturbance from vehicular traffic. The nesting eagles do not appear to be overly disturbed by the existing (sparse) amount of vehicular usage of the road.

Potential beneficial impacts

Implementation of the enhancement measures designed to restore/construct wetlands, establish a riparian corridor, minimize habitat fragmentation, and establish and provide instream flows may result in increased numbers of prey species such as waterfowl, small game, and fish. Additionally, efforts to regenerate cottonwood stands along the river may result in additional roosting/nesting sites in the project area.

Peregrine Falcon

Potential adverse impacts

The limited occurrence of this species in the project area makes the chance of any detrimental impacts to the species remote. However, the discussions above for the bald eagle regarding, open water during the winter, threat of toxic spills, and danger from new powerlines apply for falcons that may migrate through the project area.

Potential beneficial impacts

Implementation of the enhancement measures as discussed above under the bald eagle may benefit the peregrine falcon to some extent. Expected benefits would derive from increased prey species numbers.

Piping Plover/Least Tern

These species are addressed in common due to similarity in habitat requirements and because neither have been documented in the project area. No adverse impact is anticipated for either species due to the historical paucity of suitable habitat in the project area. However, suitable to marginally suitable habitat may become available below the high water mark in the reservoir during the drawdown for construction. Use of these areas would not be expected unless high water levels or other environmental factors precluded these species from using more suitable areas in the Missouri, Milk, and Yellowstone drainages. If piping plovers or least terns establish nesting areas in the lowered pool area they may be displaced after refilling of the reservoir.

Pallid Sturgeon

Potential adverse impacts

Since pallid sturgeon are not known to occur in the project area, the potential for adverse impacts are low. Reduced river flows during the construction period may reduce the suitability of the habitat at the mouth of the river for this species. However, lack of suitable habitat does not appear to be a major limiting factor for pallid sturgeon in the vicinity of the project area. Any pallids affected by the reduced flows could retreat to the Yellowstone River where presumably suitable habitat is readily available.

Accidental discharge of toxic chemicals, including petroleum products, could adversely affect this species. A discharge of this type would have to be of great magnitude to have a perceptible impact nearly 190 miles downstream.

Potential beneficial impacts

The establishment and provision of adequate instream flows as part of the enhancement measures associated with the project could benefit the pallid sturgeon by making the existing habitat more attractive or opening up new areas previously thought unusable. Additionally, if a fish passage structure suitable for use by sturgeon is constructed at the T&Y Diversion Dam, additional habitat would become available.

Black-footed Ferret

Potential adverse impacts

Since the black-footed ferret is not believed to occur in the project area, the potential for adverse impacts to the species is remote. Any adverse impacts would be expected to be the result of project impacts on prairie dogs. One small, isolated, black-tailed prairie dog colony occurs on the east side of the reservoir near the mouth of an ephemeral stream. This colony is not of suitable size to support black-footed ferrets. The colony may be gradually affected by raised groundwater levels following refilling of the reservoir. It is anticipated that prairie dogs affected in this manner would likely relocate a short distance upgradient of their present location.

Potential beneficial impacts

The implementation of enhancement measures designed to restore and preserve native short-grass prairie ecosystems, including prairie dog colony complexes, may benefit the black-footed ferret if complexes of sufficient size to support ferrets can be preserved or established.

Category 1 Candidate Species

Mountain Plover

Potential adverse impacts

The potential for adverse impacts to this species is remote due to the apparent lack of suitable habitat in the project area.

Potential beneficial impacts

Implementation of enhancement measures designed to restore and preserve native short-grass prairie ecosystems may benefit this species to some degree. However, lack of historical records for this species in the project area may indicate that habitat factors such as topography and elevation do not meet the needs/preferences of this species.

Sturgeon Chub

Potential adverse impacts

The greatest potential for adverse impacts to the sturgeon chub would result from low flows during the construction period. However, the stream reach in which this species historically has been collected is perennially dewatered during the irrigation season. This situation is not expected to change appreciably during the construction phase of the project. The T&Y Irrigation Company holds and exercises the senior direct flow right on the river. It is reasonable to assume that it will continue to divert the allotted water during construction and virtually dewater the stream for some distance below the T&Y diversion dam.

Potential beneficial impacts

Benefits could accrue to this species from the implementation of enhancement measures which provide increased instream flows during critical periods or provide passage around those structures blocking fish migration. At present, it is not known what level of instream flow is needed to benefit this species. It is reasonable to assume, however, that provision of any level of flow in those perennially dewatered stream reaches would be an improvement over present conditions. The same reasoning may be applied to the issue of fish passage. Although it has not been documented that lack of habitat in the project area is a limiting factor for this species, it is reasonable to assume that allowing this species access to portions of the river with better flow conditions would be a benefit.

Sicklefin Chub

Due to the close association of the sicklefin chub and the sturgeon chub, the discussions of adverse and beneficial impacts above is applicable for this species.

Category 2 Candidate Species

In the discussions of category 2 species where no adverse impact is predicted based on apparent non-occurrence of the species in the project area, the prediction of potential beneficial impacts is based on the establishment or expansion of suitable habitat.

Spotted Bat

Potential adverse impacts

This species has not been documented in the project area, and the project will not disturb roosting areas such as caves and crevices in cliffs. Therefore, the potential for adverse impacts to this species is judged to be remote.

Potential beneficial impacts

The likelihood that benefits will accrue to this species as of the construction or enhancement phases of the project is also judged to be remote.

Small-footed Myotis

Potential adverse impacts

This species could be affected to a small degree by the gradual loss of the riparian gallery forest at the head of the reservoir. The small-footed bat is known to roost under loose bark and could experience a loss of roosting habitat. This impact is not be expected to be significant since the species also roosts under boulders, in crevices etc. and the loss of roosting trees would be a slow process, somewhat mitigated by regeneration at higher elevation.

Potential beneficial impacts

Beneficial impacts for this species could result from mitigation or enhancement measures designed to aid in the regeneration of cottonwood forests along the Tongue River, and restoration or creation of wetland areas. Regeneration of cottonwoods may result in more or improved roosting habitat in the project area. Wetland projects may provide an increased food supply for this species.

Long-eared Myotis

The discussion of adverse and beneficial impacts under the small-footed myotis are applicable for this species.

Long-legged Myotis

The discussion of adverse and beneficial impacts under the small-footed myotis are applicable for this species except that this species is probably more numerous in the project area.

Pale Townsend's Big-eared Bat

The discussion of adverse and beneficial impacts under the small-footed myotis are applicable to this species.

Swift Fox

Potential adverse impacts

No adverse impacts are predicted for this species as a result of the project due in part to the rarity of the species and the types of project impact.

Potential beneficial impacts

Implementation of enhancement measures designed to restore or preserve native short-grass prairie habitat in the project area could provide more habitat for this species. However, the overall benefit is judged to be small since the amount of prairie habitat that may be preserved or restored is minute compared to the vast areas profoundly altered by modern agricultural practices.

Northern Goshawk

Potential adverse impacts

No adverse impacts are predicted for this species since no coniferous forests will be impacted.

Potential beneficial impacts

This species may experience limited benefits arising from expanded populations of forage species associated with short-grass prairie initiatives.

Baird's Sparrow

Potential adverse impacts

No adverse impacts are predicted for this species since it has not been documented in the project area and suitable habitat is limited.

Potential beneficial impacts

Suitable habitat for the Baird's sparrow may be expanded somewhat in the project area with the implementation of the short-grass prairie enhancement measures. Changes in grazing rotation and stocking numbers associated with the enhancement measures may result in larger areas of suitable habitat. Whether there are other factors limiting use of the project area by this species is unknown.

Western Burrowing Owl

Potential adverse impacts

The most significant adverse impact to this species would result from impacts to prairie dog colonies in the project area. As discussed under the black-footed ferret heading, the only prairie dog colony potentially affected by the construction phase of the project is a small colony on the east side of the reservoir. It is expected that if the new reservoir pool affects this colony it would relocate upgradient a short distance resulting in no loss of this habitat type.

Potential beneficial impacts

Short-grass prairie initiatives including prairie dog colony management/protection may benefit this species by expanding the suitable habitat for the species in the project area.

Ferruginous Hawk

Potential adverse impacts

Only minor adverse impacts are predicted for this species. The loss of a small amount of marginally suitable habitat in the reservoir vicinity will be offset by mitigation and enhancement measures.

Potential beneficial impacts

The ferruginous hawk may benefit from the implementation of short-grass prairie initiatives which may increase prey populations.

Black Tern

Potential adverse impacts

No adverse impacts of a significant nature are predicted for this species. Historic operations of the reservoir have not been conducive to black tern nesting. If the species uses the reservoir at other times, that use may be somewhat impacted during the drawdown for construction. However, any such use is light indicating the reservoir is not an important area for the species.

Potential beneficial impacts

The restoration or creation of wetlands in the project area may present improved nesting opportunities for the black tern.

Short-horned Lizard

Potential adverse impacts

This species has been documented in the reservoir area of the project. Road building, aggregate collection, and other associated construction activities combined with the new reservoir pool will undoubtedly reduce available habitat and cause incidental mortality for this species. These effects are not judged to be significant to survival of the species, given the large area of suitable habitat in the project area.

Potential beneficial impacts

No potential benefits are predicted for this species.

Northern Sage Brush Lizard

The discussion of impacts for the short-horned lizard is applicable to this species, with the possible exception that this species may be better able to avoid incidental mortality due to its greater mobility.

Blue Sucker, Western Silvery Minnow, Plains Minnow, Flathead Chub, Paddlefish

The discussion of impacts for the category 1 sturgeon chub is applicable to these species. Although there is some differentiation in habitat usage/selection, the basic impacts and benefits from the project would accrue to these species in a like manner.

Persistentsepal Yellowcress

Potential adverse impacts

This species has not been documented in the reservoir area where the most of the ground-disturbing activates associated with this project will occur. It has, however, been documented in the lower basin, where it may occur in riparian areas in association with noxious weeds. The implementation of enhancement measures to control noxious weeds through chemical application may affect this species.

Potential beneficial impacts

This species may benefit from the implementation of enhancement measures designed to limit livestock grazing in riparian areas. Additionally, the creation of new wetlands may provide suitable habitat for colonization by this species.

CUMULATIVE IMPACTS

The most apparent cumulative impacts for this project would be associated with the proposed construction of the Tongue River Railroad Company (TRRC) extension line from Decker to Ashland and ongoing coal strip-mining operations in the reservoir area. Depending on the route selected for the line, as well as timing of construction activities, cumulative impacts of a potentially significant nature could arise from these two projects. If TRRC's preferred alternative is selected and construction of the two projects proceeds concurrently, the combination of the activities could potentially preclude use of the upper reaches of the river below the dam by bald eagles or peregrine falcons. Other cumulative impacts could result from transportation of construction materials for the two projects.

The combination of the construction phase of the Tongue River Basin Project and ongoing mining operations will produce short-term cumulative impacts resulting from increased noise levels and sagebrush/prairie habitat destruction. These impacts are not judged to be significant in the long-term.

COORDINATION MEASURES

The following measures are designed to eliminate or lessen the severity of adverse impacts to the listed species and will be included as commitments in the Record of Decision for the Project.

THREATENED AND ENDANGERED SPECIES

Bald Eagle

(1) At a minimum, second option planning as delineated in the **"Montana Bald Eagle Management Plan, July 1994"** (Management Plan) will be applied for the nest site 2.5 miles downstream of the dam and any others identified in the project area. This approach defines 3 concentric nest-site management zones around the nest. For each zone there is a set of guidelines for managing activities in that zone, with restrictions generally decreasing as distance from the nest increases. Under this planning scenario the outer-most zone extends 2.5 miles from the nest.

If as a result of final design considerations, construction activities are proposed which would abrogate guidelines set forth in the Management Plan, third or fourth option planning would be conducted to determine if the proposed activities would be allowable. These planning options involve a researched, site-specific approach to define which specific areas are being used by the eagles.

The following measures will be applied to augment or supplement the guidelines contained in the Management Plan.

(2) Prohibit usage of the county road adjacent to the nest site for project-related traffic during the February 1 to August 15 period for each year of construction. Project-related traffic includes, but is not limited to; trucks and heavy equipment. Commuting workers would be encouraged to avoid the area.

(3) Monitor the project area, with emphasis on the upper river, for nesting bald eagles or adult eagles exhibiting nesting behavior, each spring beginning in 1995 and continuing through the completion of dam rehabilitation activities.

(4) Monitor upper project area (reservoir and approximately 5 miles downstream) for bald eagle presence and use during fall, winter and spring of each construction season. Ice conditions in the river should be monitored during low flow periods to ensure that sufficient open water exists to attract waterfowl. If it does not, flows in the river would be increased to accomplish this. If storage water is not available for this purpose the project sponsors will contact USFWS to determine what other measures may be needed to minimize or eliminate impacts to the bald eagle.

(5) Post and enforce vehicle speed limits in the reservoir area including the downstream construction area to lessen the risk of vehicle collisions with big game. The combination of less carrion and lower speeds will reduce the risk of bald eagle/vehicle collisions.

(6) Employ high construction standards and rigid safety precautions to minimize the potential for an accidental spill or discharge of any chemical or petroleum product. Additionally, spill control plans/measures will be in place prior to the beginning of construction.

Peregrine Falcon

(1) Items 4, 5, and 6 described under bald eagle are applicable to the peregrine falcon.

(2) The project area will be surveyed for peregrine falcons during the spring, summer and fall of 1995 prior to the beginning of construction activities. If peregrines are documented in the project area, a determination will be made at that time regarding potential impacts of specific construction activities and the need for additional coordination measures.

Piping Plover and Least Tern

(1) The surveys conducted in 1991 in conjunction with preparation of the CAR are considered coordination measures to reduce potential adverse impacts to piping plovers and least terns. The reservoir area will be surveyed in the spring and summer of 1995, and during the construction drawdown to determine if either of these species has begun to use the area. If nesting birds are located during these subsequent surveys, consultation with USFWS will immediately be re-initiated.

Pallid Sturgeon

(1) The surveys conducted in 1991 in conjunction with preparation of the CAR for this project in 1991 are considered to be coordination measures to reduce potential adverse impact to the pallid sturgeon. If other evidence of the existence of this species in the project area, such as an incidental catch by a fisherman or collection by MDFWP during electroshocking or netting arises, consultation with USFWS will immediately be re-initiated.

Black-footed Ferret

(1) A ferret survey will be conducted prior to implementing any enhancement measures that will negatively affect prairie dog towns exceeding the 80-acre threshold delineated in the previously mentioned 1989 survey guidelines.

(2) If ferrets are discovered, consultation with USFWS will be immediately re-initiated.

Category 1 & 2 Candidate Species

(1) Items 5 and 6 described under bald eagle apply to candidate species.

(2) Information will be collected on candidate species in the project area in conjunction with the implementation of the enhancement measures and other project activities to aid in the understanding of the ecology of these species and determine how future project operations may affect these species.

DETERMINATION OF EFFECTS

Bald Eagle

Based upon analysis of the proposed action, the current and potential status of the species in the project area, other land use activities in the area and with the incorporation of the coordination measures recommended in this assessment, a determination of no adverse effect is concluded for the bald eagle.

Peregrine Falcon

Based upon analysis of the proposed action, the current and potential status of the species in the project area, other land use activities in the area and with the incorporation of the coordination measures recommended in this assessment, a determination of no adverse effect is concluded for the peregrine falcon.

Piping Plover and Least Tern

Based upon analysis of the proposed action, the current and potential status of the species in the project area, other land use activities in the area and with the incorporation of the coordination measures recommended in this assessment, a determination of no adverse effect is concluded for the piping plover or least tern.

Pallid Sturgeon

Based upon analysis of the proposed action, the current and potential status of the species in the project area, other land use activities in the area and with the incorporation of the coordination measures recommended in this assessment, a determination of no adverse effect is concluded for the pallid sturgeon.

Black-footed Ferret

Based upon analysis of the proposed action, the current and potential status of the species in the project area, other land use activities in the area and with the incorporation of the coordination measures recommended in this assessment, a determination of no adverse effect is concluded for the black-footed ferret.

Category 1&2 Candidate Species

Based upon analysis of the proposed action, the current and potential status of the species in the project area, other land use activities in the area and with the incorporation of the coordination measures recommended in this assessment, a determination of no adverse effect is concluded for the category 1&2 candidate species.

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Appendix C

ENHANCEMENT FEATURE PLAN

Tongue River Basin Project

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October 1994

PROJECT DESCRIPTION

Introduction

The Northern Cheyenne Indian Reserved Water Rights Settlement Act of 1992 allocated $4.6 million for enhancement of fish and wildlife habitat in the Tongue River Basin. The funds are provided pursuant to P.L. 89-72, with a cost-share arrangement of $3.5 million in federal funds and $1.1 million in state funds. The enhancement features discussed herein apply to either construction alternative being considered in the Tongue River Basin Project EIS and may be implemented regardless of which alternative ultimately is selected.

Enhancement planning for the Tongue River Basin Project has been carried out in conjunction with and parallel to other project planning, project impact mitigation planning, and environmental impact assessment and statement preparation processes. The enhancement planning activity focuses on the improvement of aquatic and terrestrial habitat in the Tongue River Basin. For the purpose of disclosure in the environmental impact statement, this Enhancement Feature Plan presents an array of alternative enhancement features. For the purpose of continuing the planning process, the plan presents a set of alternatives that can be selected from for final design.

Enhancement Planning Process

The enhancement planning process was initiated formally with the formation of the Interagency Enhancement Team (Team) and the subsequent compilation of a list of potential enhancement features, concepts and ideas for projects. The Team is comprised of the Agencies, Montana Department of Fish, Wildlife and Parks, United States Fish and Wildlife Service, and the Bureau of Indian Affairs. A list of the 17 enhancement features currently under consideration is included in **Table C-1**. Final selection of site-specific projects would be made by the project sponsors with input from the Team.

Table C-1: Potential Enhancement Features

1. Acquire lands of high habitat value through purchase or easement to enhance or protect those values.
2. Develop and enhance existing wetland sites.
3. Develop stock pond/small wetlands.
4. Construct wetlands.
5. Enhance aquatic habitat.
6. Enhance riparian habitat.
7. Enhance upland habitat by providing water, shelter belts, dense nesting cover, food plots and sediment control.
8. Enhance instream flows by: 1) a water rights acquisition program; 2) monitoring and enforcement of diversion; 3) a streamflow gaging program.
9. Provide fish passage around diversion dams.
10. Screen inlet structures at diversions.
11. Initiate livestock management and exclusion systems.
12. Enhance the Tongue River Reservoir perimeter.
13. Install bird nesting structures along the Tongue River Corridor and Reservoir Shoreline.
14. Remove trash and car bodies from selected sites.
15. Develop weed control programs.
16. Develop cooperative programs with private landowners and agencies and develop habitat conservation education program as part of an overall ecosystem management planning activity.
17. Provide short grass/native prairie ecosystem management/enhancement on the Northern Cheyenne Reservation including prairie dog reestablishment in plague-affected areas on the reservation, and a bison restoration program.

Enhancement Feature Descriptions

Listed below are the types of projects or programs currently under consideration as enhancement features. Site-specific enhancement measures may include aspects of one or many of the features listed.

Land Acquisition. Lands with high habitat values or the potential for high values would be identified and acquired through purchase or easement from willing sellers. The Agencies would establish a management plan embodying

as many of the enhancement features listed herein as is feasible upon acquisition of individual properties. After the development of the features and the establishment of protective covenants or easements, the properties would be sold or traded to private individuals. Any funds derived from the sale of properties would be used for similar acquisitions in the Tongue River Basin.

Wetland Development. Wetland enhancement may include developing existing wetland sites, constructing new wetlands, and developing stock watering/small wetland sites. In all cases, wetland enhancement relates to one or more water sources and in some cases involves water development and/or water source development.

Water development is distinguished from water source development by targeting the management of precipitation, runoff, and retention of existing water. Water source development entails the improvement of flows and use systems for springs and shallow aquifers already in use as part of habitat enhancement.

Water development is a feature of overall habitat enhancement that would involve constructing new impoundments or embankments to catch or divert runoff, or repairing or increasing the capacity of existing impoundments. The feature may be used in conjunction with a "sediment trap" and could be applied to both upland and wetland sites. An early stage of design must verify that sufficient runoff would be provided by the watershed, that soil and geotechnical conditions were suitable for proposed construction, and that overall channel hydraulics were consistent with the proposed structures and their integrity. In the case of developing or increasing the capacity of wetlands or existing impoundments, the design approach can be focused on the feasibility of enhancing the existing conditions and the impacts of such enhancement. Repairing existing impoundments is a straightforward activity of designing the procedures and materials for construction, and evaluating the impacts of retaining runoff and enhancing habitat.

Water source development is a feature of overall habitat enhancement that involves increasing flows and/or improving the management of flows from existing water sources. The capability of the water source must be carefully estimated and evaluated in the context of requirements for sustaining the proposed habitat enhancement. Following the capability evaluation, initial engineering design of water source development and impacts assessment would begin.

Water-related wetland enhancement designs for streams and impoundments are intended to divert surface water to form new wetlands. Designs may also increase the impoundment potential of an existing wetland area, develop and protect stockwatering/small wetland areas, rehabilitate and protect existing wetland features, and impound seepage.

The enhancement potential of this type of marsh is excellent. Waterfowl habitat limited by extremes in pool elevation results in few submergent and emergent aquatic plants becoming established. If portions of a reservoir are partitioned off with dikes and structural controls emplaced, water levels could be stabilized in the marshes allowing aquatic vegetation to become established.

Other features associated with wetlands enhancement include livestock exclusion and management, development of additional breeding-pair ponds, predation-management measures, establishment of appropriate vegetation types, removal of target vegetation, erosion control, and nesting-structure development.

Aquatic Habitat Enhancement. While the success of aquatic habitat enhancement is dependent on many associated structural, vegetative, and management activities, individual features deal with improving conditions for the survival of target fish species. Providing spawning areas, rehabilitating downstream stock ponds and reservoirs, screening irrigation inlets at diversions, and constructing fish passages at diversion dams are specific features potentially implementable as enhancements. Clearly, instream flow maintenance, livestock exclusion and management, establishing and protecting riparian habitat, sediment traps, and erosion control plans play a critical part in the overall success of enhancement activities and the quality of the aquatic habitat. All such features would be carefully considered when preparing aquatic enhancement plans.

Riparian Habitat Enhancement. Riparian habitat enhancement must focus on areas with identifiable, riparian wildlife management potential and supplement the mitigation plan. Riparian habitat enhancement features would focus on the establishment of woody and herbaceous growth at locations with appropriate potential.

Trees such as cottonwood, green ash, and boxelder and shrubs such as woods rose, buffalo berry, and chokecherry would be planted in areas around the new high water mark of the reservoir. Cottonwood cuttings may also be planted in adjacent overbank. Areas would be fenced or individual trees protected during seedling establishment. As with other habitat enhancement features, there are numerous design activities that may play a critical part in the success of riparian enhancement. Livestock exclusion and

management, human exclusion, timing and duration of pool elevation, and the operation/maintenance/ replacement plans would impact how the overall feature plan achieved its potential.

Upland Habitat Enhancement. Upland habitat enhancement features can use a water source as a focal point, can concentrate on vegetative features that rely only on precipitation and runoff for success, or may use both. While upland habitat is the target of enhancement feature plans, the wildlife type or mix of wildlife that rely on the habitat influences the composition of proposed food plots, the mix of shelter belt and dense nesting cover establishment, range management, and water source rehabilitation. DFWP's Upland Game Bird Habitat Enhancement Program Guidelines (Department of Fish, Wildlife and Parks 1994a) provides the fundamentals for establishing shelter belts, range management, food plots, temporary winter cover, wetland restoration and nesting cover. These guidelines serve as a basis for assessing upland wildlife management potential, enhancement needs and the components of a feature plan.

Sediment traps usually are not considered the main feature for a site but they may assist in promoting overall habitat quality. Even sediment traps themselves usually are not designed without associated soil loss reduction/ conservation programs. Sediment traps are likely to be located in upland areas and as such may be a design consideration associated with an upland water source.

Instream Flow Enhancement. Instream flow enhancement approaches include a water rights acquisition program, the establishment of a water diversion monitoring program and enforcement activity, and the implementation of a streamflow gauging program. The three potential features would be explored as to cost-effectiveness, feasibility, and implementability in subsequent stages of the enhancement planning process.

Livestock Management and Exclusion. Livestock management and exclusion may be the primary plan components for an area or part of a more complex habitat enhancement feature. In either case, the management and exclusion of livestock is most likely targeted at promoting improved vegetative condition and residual cover, restricting or controlling access during periods critical to vegetative growth and/or wildlife nesting/rearing use, promoting use of an area, and protecting an area from erosion, trailing, and streambank destruction.

Installation of Bird-Nesting Structures. Nesting structures for woodducks, raptors, and neotropical migrants may be considered as potential enhancement features. Such structures could be strategically located in areas identified by wildlife biologists in a manner that enhances use for a desirable species, enhances wildlife viewing opportunities, and at the same time protects the species from predation.

Trash Removal From Specified Sites. Enhancement of riparian habitat, water quality, aesthetics, and safety could result from the removal of vehicle bodies, farm equipment, discarded fencing, inert rubble and other solid waste deposited in or adjacent to a portion of the Tongue River channel.

Develop Weed Control Programs. As habitat enhancement feature plans proceeded toward final design, weed control measures to prevent, control or eliminate noxious or invader species would be evaluated and implemented as appropriate.

Develop Cooperative Programs. Cooperative and educational programs that are not area- or feature-specific would be included in the overall enhancement plan. Programs would include establishing cooperative agreements and easements with landowners and involved agencies, developing habitat and conservation education programs, and developing management education for livestock, range, and land treatment. An overall ecosystem management plan would be implemented when the needs and emphasis of each program were clearly defined.

Short Grass/Native Prairie Management/Enhancement. The ecological importance of native prairie ecosystems is recognized throughout the Tongue River Basin. This feature is comprised of two main programs designed to enhance the habitat values of the short grass prairie ecosystem. A prairie dog reestablishment program would be designed to repopulate selected areas of the Northern Cheyenne Reservation where bubonic plague has seriously reduced prairie dog numbers. The intent of the program would be to recover the habitat values associated with prairie dog towns and complexes, thereby benefiting the many species associated with or dependent upon these habitat values. A bison restoration program would be designed to replace cattle grazing on selected areas of the Reservation. The intent of the program would be to reduce grazing impacts, gain more efficient forage utilization, and reduce riparian zone impacts associated with cattle grazing.

Appendix D

AIR QUALITY STANDARDS

Table D-1 lists the Montana and federal ambient air quality standards. **Table D-2** lists the federal PSD Class I, II, and Class III increments for sulfur dioxide, TSP, and nitrogen dioxide.

TABLE D-1: Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Montana Standard	Primary Standard	Federal Secondary
PM-10 Suspended Particulates	Annual	50 ug/m^3	50 ug/m^3	—
	24-Hour	150 ug/m^3*	150 ug/m^3*	—
Sulfur Dioxide	Annual	0.02 ppm	0.03 ppm	—
	24-Hour	0.10 ppm*	0.14 ppm*	—
	1-Hour	0.50 ppm**	—	—
	3-Hour	—	—	0.5 ppm*
Carbon Monoxide	8-Hour	9 ppm*	9 ppm*	9 ppm*
	1-Hour	23 ppm*	35 ppm*	—
Nitrogen Dioxide	Annual	0.05 ppm	0.05 ppm	0.05 ppm
	1-Hour	0.30 ppm*	—	—
Photochemical Oxidants (ozone)	1-Hour	0.10 ppm*	0.12 ppm*	0.12 ppm*
Lead	90-Day	1.5 ug/m^3	—	—
	Quarter	—	1.5 ug/m^3	—
Hydrogen Sulfide	1 Hour	0.05 ppm*	—	—
Settled Particulate (Dustfall)	30-Day	10 gm/m^2	—	—
Visibility	Annual	3x10^{-5} per meter part scattering***	—	—

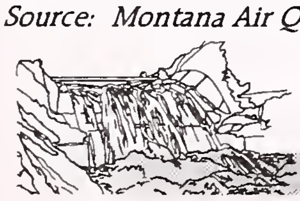
Source: Montana Air Quality Bureau 1991.
ug/m^3=Micrograms pollutant per cubic meter of sampled air.
ppm=Parts pollutant per million parts of sampled air.

** Not to be exceeded more than an average of once per year, averaged over 3 years.*
*** Not to be exceeded more than 18 times per year.*
**** Applies to PSD mandatory Class I area.*

TABLE D-2: Federal Prevention of Significant Deterioration Allowable Increments

Micrograms Per Cubic Meter	I	II	III	Not To Exceed
Particulates				
Annual Geo. Mean	5	19	37	75
Maximum 24-Hour	10	37	75	150
Sulfur Dioxide				
Annual Arith. Mean	2	20	40	80
Maximum 24-Hour	5	91	182	365
Maximum 3-Hour	25	512	700	1300
Nitrogen Dioxide				
Annual Arith. Mean	2.5	25	50	94

Source: Montana Air Quality Bureau 1993.



APPENDIX E

HYDROLOGIC DATA

SPILLWAY DESIGN FLOOD SELECTION

The design level probable maximum flood (PMF) for the Tongue River Dam has been determined to be 382,000 cubic feet per second (cfs) (Harza Engineering Company 1983). Alternatives for repairing and enlarging the dam and spillway to pass the full PMF are cost-prohibitive, with construction costs estimated to be $135 million (Montana Department of Natural Resources and Conservation 1985). In recent years, criteria and guidelines have been developed (U.S. Bureau of Reclamation 1989) to assist with the selection of a spillway design flood (SDF). Application of these criteria and guidelines can demonstrate that a design flood less than the full PMF may be justified in certain cases. Reclamation applied these procedures to assess the situation for the Tongue River Dam emergency spillway (U.S. Bureau of Reclamation 1989a). Reclamation concluded that rehabilitation of the existing spillway to the original design capacity and installation of an early warning system would be adequate to meet federal dam safety standards and guidelines. Final adoption of the Reclamation findings may, however, be modified to take into account elements of the state dam safety law as well as more conservative approaches to the guidelines and criteria involving warning time.

Warning time was based on a number of factors as follows:

1. Evacuation routes out of the canyon for the first 12 miles below the dam are limited. The first all-weather road exiting laterally from the canyon is at Four Mile Creek, located about 12.5 river miles downstream of the dam. Given the lack of evacuation routes out of the canyon, the need for adequate warning time is particularly critical in this reach.

2. The remote location of the Tongue River Dam is such that a conservative warning time is needed to carry out the evacuation notice.

3. DNRC and State Disaster and Emergency Services (DES) officials have indicated that, as a rule of thumb, a minimum warning time of approximately 4 hours is required to successfully evacuate populations where the downstream hazard area contains more than 20 residences.

4. Residences below the dam with less than 4 hours warning time are sparsely distributed and will require special notification procedures during high water in order to successfully implement an evacuation plan. Communities below the dam, such as Birney Village, require special attention due to potential language barriers, especially among some elderly Northern Cheyenne Tribal members that reside in these communities.

Evaluation

A total of five flood events, ranging from 60,000 cfs to 382,000 cfs (full PMF), were analyzed as the spillway design flood. The discharge equal to 60,000 cfs is about 16 percent of the PMF and represents the original spillway design flood (Harlan Miller Tait Association 1985). Intermediate floods of 100,000 cfs, 150,000 cfs, and 191,000 cfs were also investigated. The reservoir has a relatively small effect in attenuating the flood peaks associated with events of these magnitudes. Each loading was performed using a spillway configuration that would prevent an overtopping failure of the earthen dam embankment. Each of the five floods were routed through the reservoir and downstream approximately 34 river miles to the community of Birney using the National Weather Service computer program DAMBRK (Fread 1988). Results are shown in **Table E-1.**

TABLE E-1: Results of Hydrologic Loadings on Downstream Incremental Population at Risk (PAR) Tongue River Dam to Birney

Spillway Design Flood Discharge (cfs)	Approximate Percent of PMF	Incremental PAR Relative to Full PMF Design [1]
60,000	16	12
100,000	26	0
150,000	39	0
191,000	50	0
382,000	100	0

Note: [1] Each residence is assigned four-person occupancy in estimating population at risk (PAR) (U.S. Bureau of Reclamation 1989).
Source: DNRC 1990.

The increments of dam-related population at risk PAR shown in **Table E-1** (column 3) are essentially the same for natural loadings (i.e., no dam) and represent the opportunity cost of not providing a particular level of spillway capacity, relative to the full PMF. Results in **Table E-1** focus on the 34-mile reach of the Tongue River from the dam to Birney.

Preliminary selection of the SDF primarily was based on two concepts. The first concept involves PAR given various

hydrologic loading conditions. The second concept integrates warning time with PAR to establish a finite location downstream of the dam beyond where it can be assumed that people can be safely evacuated.

Under the DAMBRK program analysis, floods of 100,000 cfs or greater resulted in no increase for incremental population at risk between the dam and Birney. A SDF of 60,000 cfs, however, could result in the inundation of several dwellings at higher flood flows. A SDF of 60,000 cfs may not provide a sufficient factor of safety to prevent dam-related inundation to the identified population at risk from the dam to Birney. SDF studies by DNRC and Reclamation indicate that a defensible case can be made to select a SDF less than the full PMF. Therefore, the Agencies have selected a SDF of 100,000 cfs to assure that these persons are not at risk. Warning time from the dam to a distance 34 miles downstream would be equal to or less than 4 hours. Farther downstream, however, an evacuation plan coupled with 4 hours or more of warning time is assumed to result in no additional loss of life. Incorporation of the emergency action plan with the final design should result in an acceptable level of risk, particularly for residences downstream of Birney where warning time would likely exceed 4 hours.

The selection of an SDF and spillway alternative would affect the downstream floodplain. The applicability of the state floodplain regulations, including the 0.5-foot floodway increase, would be investigated by DNRC during the selection of a spillway alternative.

Flood Frequency of SDF Loadings Investigated

Flood frequency analyses have been performed by PRC Engineering (1986) for spring and summer floods for the Tongue River Dam. Using the flood frequency curves, return periods were estimated for each loading and are summarized in **Table E-2**.

THE TONGUE RIVER MODEL

Much of the hydrologic information presented in the EIS was developed using the Tongue River computer model. The Tongue River model is actually two models: a water allocation model and a reservoir operations model. The water allocation model divides Tongue River flows between the states of Montana and Wyoming, as specified in the Yellowstone Compact. The reservoir operations model pertains to storing, spilling, and releasing water from the Tongue River Reservoir, and predicts downstream flows at Miles City.

Both models are water accounting models written in the FORTRAN computer language. The models have a function similar to a big balance sheet. They keep a monthly record of water losses, gains, returns, and releases in the Tongue River/Reservoir system. They use streamflow data from past years as the primary input, and assume that future streamflows will be like those that occurred previously, with adjustments made for future water development. For the EIS analysis, a 44 year period (1946-1989) was simulated.

The Water Allocation Model

The purpose of the Tongue River water allocation model is to determine the amount of water that will be available for storage in the Tongue River Reservoir after water is allocated between Montana and Wyoming under the terms of the Yellowstone Compact. To understand how the water allocation model works, some background is needed on the Yellowstone Compact. The Yellowstone Compact apportions water in the Yellowstone River and its tributaries among Montana, Wyoming, and North Dakota. Tongue River water is apportioned between Montana and Wyoming with two stipulations: (1) that appropriative rights existing prior to January 1, 1950 are protected and administered under the doctrine of prior appropriation, and (2) that the remaining flow is to be allocated 60 percent to Montana and 40 percent to Wyoming. The 60/40 is for all water that originates in the Tongue River basin, from its headwater to its mouth near Miles City.

TABLE E-2: Return Period Estimates for Tongue River at Dam

Spillway Design Flood Discharge (cfs)	Spring Flood Return Period (yrs)	Summer Flood Return Period (yrs)
60,000	2,000	18,000
100,000	3,300	100,000
150,000	10,000	175,000
191,000	18,000	not estimated
382,000	100,000	not estimated

Source: PRC Engineering 1987.

The primary input to the water allocation model is streamflow data for the Tongue River near the Montana-Wyoming state line from previous years. The model then

estimates future flows for the Tongue River near Miles City by adjusting the data to account for "pre-1950 water uses," water development up to the year 1980, evaporation from the Tongue River Reservoir, and gains and losses of streamflow between the dam and Miles City. In the water allocation model, water uses that are accounted for as pre-1950 uses include the following: (1) all water developed by the two states in the basin prior to 1950, (2) Wyoming and Montana supplemental water rights, and (3) Northern Cheyenne Compact rights.

Using the calculated flows for Miles City, the water allocation model then estimates what will be available for storage in the Tongue River Reservoir in the future, given the stipulations of the Yellowstone Compact. It does this by (1) assuming that 40 percent of the Miles City flows will allocated to Wyoming, and (2) subtracting this 40 percent—40 percent of the Miles City flows—from estimated reservoir inflows (flows near the Montana-Wyoming state line). These adjusted reservoir inflows are used as the input data to the reservoir operations model. **Figure E-1** is a basic diagram of the water allocation model.

Under scenarios where no increase in Wyoming development is assumed, inputs to the reservoir operations model are equal to previous reservoir inflows adjusted to a 1980 level of water development.

The Reservoir Operations Model

The reservoir operations model takes the estimated reservoir inflows generated by the water allocation model and calculates the effects of storing, spilling, or releasing the flows, based on reservoir operations criteria and downstream demands. Output produced by the model includes estimated end-of-month reservoir contents, and reservoir releases for each month of the 44-year period simulated. The model keeps track of the amount of water that would be supplied to the various users, assuming conditions during the 44 years after the dam is rebuilt are similar to those that occurred between 1946 and 1989. The model also notes whether the water supplied would come from direct flow into the reservoir, or stored water that is later released. It also records estimated water shortages that would affect the Tribe and existing users. The model also predicts what Miles City flows would be, assuming conditions similar to those that occurred between 1946 and 1989.

The basic reservoir operation rule used by the model is that water is released only for a specified purpose—all other water is stored for later use. Direct flow that can not be stored is supplied to downstream users according to priority. Minimum winter releases also can be stipulated in the model, and the instream releases for fish and wildlife during other times of the year can be simulated. **Figure E-2** is a basic diagram of the reservoir operations model.

Important input data to the water allocation model includes water use requirement for the Tribe and other water users. The water requirements used for existing non-Tribal water users were estimated by subtracting the 80th percentile (2 driest years out of 10) streamflows at Miles City from those at the Tongue River Dam, while accounting for tributary inflows between the two stations. Future depletions by the Northern Cheyenne Tribe were estimated based on the amount of water supplied by the Compact, and the type of use anticipated. Current model inputs assume an existing reservoir capacity of 66,600 af and a future reservoir capacity of 80,200 af.

MODEL RESULTS

Model Results for the water development scenarios presented in **Chapter 4** are summarized in **tables E-3 through E-9**. The reservoir operations tables summarize end of month reservoir contents and elevations. The streamflow tables summarize monthly average streamflows, under the various scenarios, below the dam and at Miles City.

In these tables, the median is the streamflow that is exceeded half the time - the other half of the time, it is less. Similarly, the 80th flow presented in the table is the flow that is exceeded 80 percent of the time in that month.

WATER RIGHTS AND AVAILABILITY

To satisfy the terms of the Northern Cheyenne - State of Montana Water Rights Compact (Compact), the rehabilitation and enlargement of the Tongue River Dam would allow the Northern Cheyenne Tribe to divert up to 20,000 afy from a combination of water stored in the reservoir and exchange water. A second component of the Compact allows the Tribe to divert up to 12,500 afy from the direct flow of the Tongue River. These rights (storage and exchange water from the enlarged reservoir and direct flows from the river) would be in addition to the existing Tribal water purchase contract for 7,500 afy.

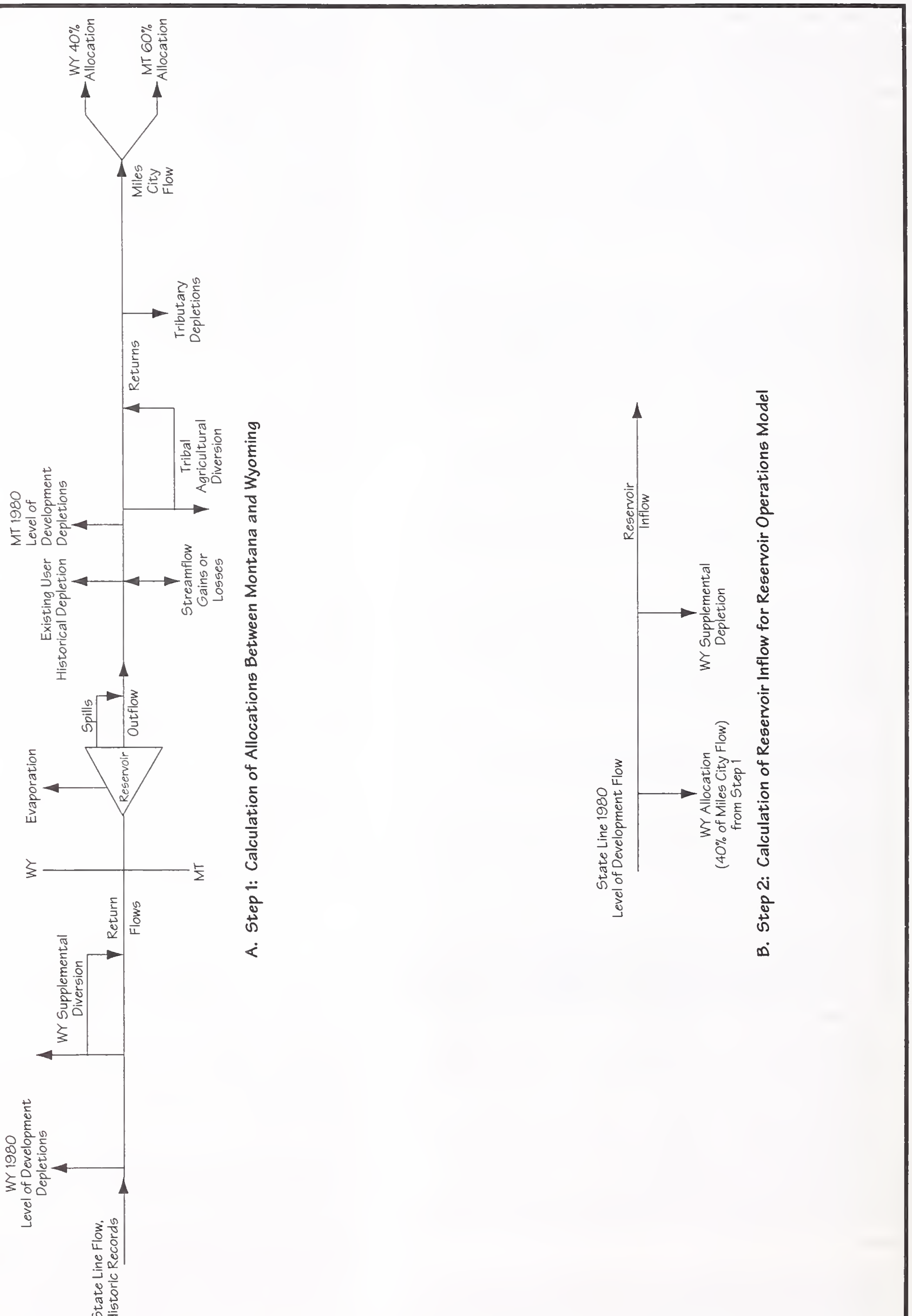


Figure E-1. Tongue River Water Allocation Model Diagram

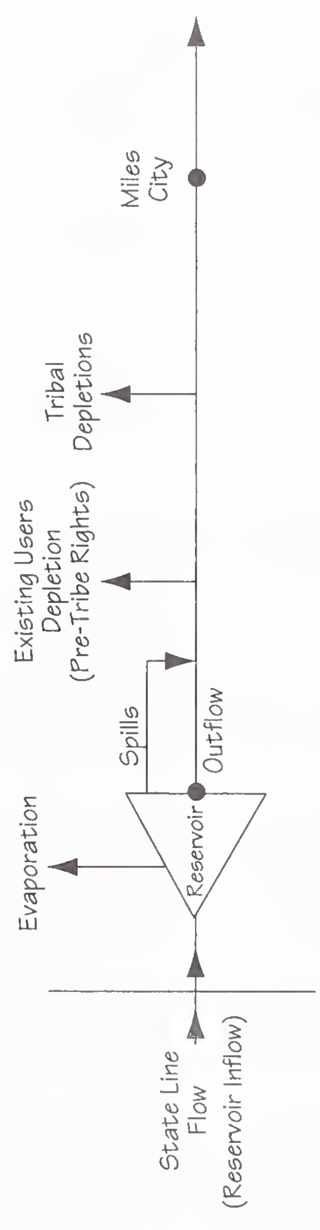


Figure E-2. Tongue River Reservoir Operations Model Diagram

The amount of water that would be available from the enlarged project has been evaluated in a modeling study (Geo Research, Inc. 1991). Six cases of water use proposed by the Northern Cheyenne Tribe are documented in that investigation.

The six cases investigated presented different allocations of Tribal water between agricultural and industrial uses. Four of the cases assume a firm supply of water, and two allow shortages in the agricultural supply. The Compact states that shortages shall not exceed 50 percent of the water compacted to the Tribe in any 1 year, and cumulatively shall not exceed 100 percent of the Tribe's rights in any 10 years. These shortage criteria only apply to the 32,500 acre-feet of compact water; supply of the Tribe's existing 7,500 acre-feet of contract water is firm.

The method of analysis used protects the water supply of existing users by subordinating the Tribe's priority to direct flows after other Miles City Decree users and by operating the reservoir in a manner that prevents it from completely emptying. However, existing users are subject to shortages in 22 percent of the years analyzed because of an insufficient stored water contract amount. Future stored water shortages would be shared proportionately by all water rights holders entitled to Tongue River Reservoir water.

The evaluation allowed for the delivery of the instream flows at the dam and at Miles City that are required by the Yellowstone Water Reservations of 1978. These instream flows are often not available because of their junior priority date. Instream flow availability likely would not change with the proposed project. The overall water supply available in Montana is expected to decrease by over 50 percent if Wyoming appropriates all of its supplemental water and its water allocation under the Yellowstone Compact. Reservoir contents, however, would be significantly higher than in the past because of the increased capacity of the reservoir and the operation of the dam strictly for water supply without the present concern for prevention of spills.

Although the Tribe's combined water rights from reservoir storage and direct flow total 40,000 afy, exchange water and end use of the water (agricultural or industrial) would influence the ultimate supply. Exchange water is that available for diversion by the Tribe from direct flow or from reservoir storage, in exchange for making its return flows available to other users. If the Tribe were to use all of its water for agriculture, it could divert up to 40,000 afy — assuming that 5,000 afy of return flows would be available to other users as exchange water. If all water was diverted for an industrial use that generated no return flows, there would be no exchange water credit and the Tribe could use a maximum of 35,000 afy.

Tongue River Reservoir Firm Annual Yield

Although the capacity of the reservoir would be raised by 13,000 af, the firm annual yield of the reservoir would only increase by about 7,000 af.

The firm annual yield of a reservoir is the amount of water that can be supplied by it during the driest of years. The firm annual yield is generally calculated by hypothetically increasing demands on the reservoir until it empties during a critical dry period. The critical period used to model the firm annual yield for the Tongue River Reservoir is 1959 to 1961. When excessive demands are placed on the reservoir during this period using the Tongue River model, it is drawn low by the end of the irrigation season in 1960, does not completely refill in the spring of 1961, and is emptied (drawn down to dead storage) by the end of the irrigation season in 1961.

Firm annual yield is affected by reservoir inflows, and the type and amount of prior downstream rights. Calculations of the firm annual yield for the Tongue River Reservoir are highly sensitive to the level of future Wyoming development assumed, the extent of the direct flow rights of non-indian Tongue River water users, the Tribe's direct flow rights, and the type of use assumed. Because of this, past estimates of the firm annual yield for the reservoir at existing capacity (66,638 af) have ranged from about 47,000 to 60,000 af, while estimates of firm annual yield for the an enlarged project (80,254 af) range from 53,000 to 67,000 af. However, these analyses have generally found that enlarging reservoir to a capacity of 80,254 af would increase the firm annual yield of the project by about 7,000 af.

For this Final EIS, the Tongue River model was run to estimate the firm annual yield of the existing and expanded reservoir assuming that: (1) Wyoming develops all water allocated to it by the Yellowstone Compact, and (2) that the Tribe has direct flow rights to 12,500 afy of water as stated in the Northern Cheyenne Compact. Under these assumptions the firm annual yield of the existing project is about 47,000 afy, and the firm annual yield of the expanded project (80,254 afy of storage) would be about 54,000 afy.

TABLE E-3: Tongue River Reservoir Historical Reservoir Operations (Period From 1946 to 1989)

Historic Reservoir Elevations (feet)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	3,403.1	3,402.4	3,401.9	3,402.3	3,404.2	3,409.0	3,409.0	3,414.7	3,418.9	3,415.3	3,408.3	3,403.7	3407.7
Median	3,402.6	3,403.6	3,401.4	3,398.3	3,400.9	3,408.9	3,407.7	3,414.7	3,419.8	3,415.3	3,408.9	3,403.2	3407.1
80th	3,396.2	3,391.1	3,390.6	3,391.1	3,391.3	3,398.2	3,399.6	3,406.2	3,414.8	3,411.9	3,402.7	3,397.1	3399.2
60th	3,401.4	3,397.8	3,395.5	3,396.2	3,398.7	3,405.0	3,404.9	3,412.2	3,417.8	3,413.2	3,408.1	3,402.3	3404.4
40th	3,406.2	3,405.9	3,406.7	3,407.2	3,408.3	3,412.1	3,412.2	3,415.4	3,420.6	3,416.3	3,410.0	3,405.8	3410.6
20th	3,409.1	3,410.6	3,408.7	3,411.0	3,412.7	3,415.8	3,415.7	3,420.7	3,422.7	3,418.6	3,411.8	3,409.5	3413.9
Maximum	3,411.1	3,413.8	3,414.5	3,414.9	3,418.0	3,421.2	3,422.0	3,424.8	3,424.7	3,421.6	3,417.7	3,415.2	3418.3
Minimum	3,370.7	3,381.8	3,381.8	3,376.5	3,381.6	3,388.9	3,388.5	3,401.0	3,407.2	3,398.6	3,384.9	3,370.1	3386.0

Historic Reservoir Contents (acre-feet)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	21, 741	20,823	20,216	20,743	23,277	30,109	30,180	40,770	50,873	42,007	29,080	22,627	29,370
Median	21,100	22,500	19,500	16,100	18,900	30,000	28,200	40,700	53,200	42,000	30,000	21,900	28,675
80th	14,200	9,500	9,100	9,500	9,700	16,000	17,300	26,000	40,900	35,400	21,300	15,000	18,658
60th	19,500	15,700	13,600	14,200	16,500	24,300	24,100	36,000	48,200	37,800	28,800	20,800	24,958
40th	26,000	25,500	26,700	27,400	29,100	35,800	36,000	42,200	55,500	44,400	31,700	25,400	33,808
20th	30,400	32,800	29,800	33,700	36,800	43,400	43,000	55,800	61,700	50,100	35,200	30,900	40,300
Maximum	33,800	39,000	40,400	41,100	48,600	57,300	59,500	68,000	67,700	58,500	48,000	41,800	50,308
Minimum	900	4,100	4,100	2,100	4,000	7,900	7,700	19,000	27,500	16,400	5,800	800	8,358

TABLE E-4: Tongue River Reservoir Modeled Operations

Reservoir Contents (acre-feet) Full Tribal Irrigation Development, No Further Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	52,800	56,500	58,400	59,900	61,800	66,000	69,800	74,500	77,600	72,800	59,800	54,900	63,700
Median	55,700	61,900	64,100	66,200	71,100	77,600	80,300	80,300	80,300	77,500	63,600	60,300	68,600
80th	38,500	40,400	43,100	43,800	45,000	47,500	52,700	69,300	80,300	69,900	54,000	45,600	54,500
60th	53,500	57,600	62,400	63,900	64,900	69,400	77,800	80,300	80,300	73,300	62,200	56,100	66,600
40th	60,000	64,200	65,500	69,200	73,400	80,300	80,300	80,300	80,300	80,300	66,600	61,700	70,300
20th	67,300	72,900	75,100	78,600	80,300	80,300	80,300	80,300	80,300	80,300	68,300	66,700	74,800
Maximum	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300
Minimum	1,600	5,500	6,000	6,000	6,000	6,000	3,400	2,200	16,100	1,500	1,500	1,500	7,900

TABLE E-4 *continued:* Tongue River Reservoir Modeled Operations

Reservoir Elevations (feet) Full Tribal Irrigation Development, No Further Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	3,419.7	3,420.9	3,421.6	3,422.1	3,422.7	3,424.1	3,425.3	3,426.7	3,427.6	3,426.2	3,422.1	3,420.4	3,423.4
Median	3,420.7	3,422.8	3,423.5	3,424.2	3,425.7	3,427.6	3,428.4	3,428.4	3,428.4	3,427.5	3,423.3	3,422.2	3,424.9
80th	3,413.5	3,414.5	3,415.7	3,416.0	3,416.5	3,417.5	3,419.6	3,425.1	3,428.4	3,425.3	3,420.1	3,416.7	3,420.3
60th	3,419.9	3,421.3	3,422.9	3,423.4	3,423.8	3,425.2	3,427.6	3,428.4	3,428.4	3,426.3	3,422.9	3,420.8	3,424.3
40th	3,422.1	3,423.5	3,424.0	3,425.1	3,426.3	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,424.3	3,422.7	3,425.4
20th	3,424.5	3,426.2	3,426.8	3,427.9	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,424.8	3,424.4	3,426.8
Maximum	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.3
Minimum	3,374.8	3,384.4	3,385.3	3,385.3	3,385.3	3,385.3	3,380.5	3,376.8	3,398.3	3,374.4	3,374.4	3,374.4	3,388.8

Reservoir Contents (acre-feet) Full Tribal Irrigation Development, Full Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	30,500	34,300	35,600	36,100	36,600	37,900	40,800	51,700	65,300	56,200	39,400	33,900	41,525
Median	34,300	39,800	39,800	39,800	39,800	43,500	44,200	55,200	78,500	66,200	45,600	35,200	46,558
80th	2,400	4,200	6,900	9,500	11,300	17,800	20,700	25,100	48,100	33,500	15,100	8,000	18,500
60th	27,100	29,600	32,000	32,000	32,000	31,800	38,700	47,500	71,400	53,800	39,300	34,000	43,025
40th	40,900	47,200	48,200	48,200	48,600	50,200	49,300	62,500	80,300	70,700	51,000	44,300	50,358
20th	51,800	57,000	58,800	59,500	59,600	59,500	59,800	80,300	80,300	75,900	57,800	53,400	61,275
Maximum	73,900	80,300	80,300	80,300	80,300	79,900	80,300	80,300	80,300	80,300	69,300	74,700	74,733
Minimum	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,400	1,500	1,500

Reservoir Elevations (feet) Full Tribal Irrigation Development, Full Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	3,409.2	3,411.4	3,412.0	3,412.3	3,412.6	3,413.2	3,414.7	3,419.2	3,423.9	3,420.8	3,414.0	3,411.1	3,415.1
Median	3,411.4	3,414.2	3,414.2	3,414.2	3,414.2	3,415.9	3,416.2	3,420.5	3,427.8	3,424.2	3,416.7	3,411.8	3,417.1
80th	3,377.5	3,382.0	3,387.0	3,391.1	3,393.0	3,400.1	3,402.3	3,405.6	3,417.7	3,410.9	3,397.2	3,389.0	3,400.6
60th	3,407.0	3,408.6	3,410.2	3,410.2	3,410.2	3,410.0	3,413.7	3,417.5	3,425.7	3,420.0	3,414.0	3,.411.2	3,415.7
40th	3,414.8	3,417.4	3,417.8	3,417.8	3,418.0	3,418.6	3,418.2	3,423.0	3,428.4	3,425.5	3,418.9	3,416.2	3,418.7
20th	3,419.2	3,421.1	3,421.7	3,422.0	3,422.0	3,422.0	3,422.1	3,428.4	3,428.4	3,427.1	3,421.4	3,419.9	3,422.5
Maximum	3,426.5	3,428.4	3,428.4	3,428.4	3,428.4	3,428.2	3,428.4	3,428.4	3,428.4	3,428.4	3,425.1	3,426.7	3,426.7
Minimum	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,373.9	3,374.4	3,374.4

TABLE E-4 *continued:* **Tongue River Reservoir Modeled Operations**

Reservoir Contents (acre-feet) No Tribal Development , Full Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	52,800	56,500	58,400	59,900	61,800	66,000	69,800	74,500	77,600	72,800	59,800	54,900	61,267
Median	55,700	61,900	64,100	66,200	71,100	77,600	80,300	80,300	80,300	77,500	63,600	60,300	64,342
80th	38,500	40,400	43,100	43,800	45,000	47,500	52,700	69,300	80,300	69,900	54,000	45,600	53,400
60th	53,500	57,600	62,400	63,900	64,900	69,400	77,800	80,300	80,300	73,300	62,200	56,100	62,500
40th	60,000	64,200	65,500	69,200	73,400	80,300	80,300	80,300	80,300	80,300	66,600	61,700	67,600
20th	67,300	72,900	75,100	78,600	80,300	80,300	80,300	80,300	80,300	80,300	68,300	66,700	71,342
Maximum	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	79,308
Minimum	1,600	5,500	6,000	6,000	6,000	6,000	3,400	2,200	16,100	1,500	1,500	1,500	9,425

Reservoir Elevations (feet) No Tribal Development, Full Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	3,419.7	3,420.9	3,421.6	3,422.1	3,422.7	3,424.1	3,425.3	3,426.7	3,427.6	3,426.2	3,422.1	3,420.4	3,422.5
Median	3,420.7	3,422.8	3,423.5	3,424.2	3,425.7	3,427.6	3,428.4	3,428.4	3,428.4	3,427.5	3,423.3	3,422.2	3,423.6
80th	3,413.5	3,414.5	3,415.7	3,416.0	3,416.5	3,417.5	3,419.6	3,425.1	3,428.4	3,425.3	3,420.1	3,416.7	3,419.9
60th	3,419.9	3,421.3	3,422.9	3,423.4	3,423.8	3,425.2	3,427.6	3,428.4	3,428.4	3,426.3	3,422.9	3,420.8	3,423.0
40th	3,422.1	3,423.5	3,424.0	3,425.1	3,426.3	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,424.3	3,422.7	3,424.6
20th	3,424.5	3,426.2	3,426.8	3,427.9	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,424.8	3,424.4	3,425.7
Maximum	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.1
Minimum	3,374.8	3,384.4	3,385.3	3,385.3	3,385.3	3,385.3	3,380.5	3,376.8	3,398.3	3,374.4	3,374.4	3,374.4	3,391.0

Reservoir Contents (acre-feet) Instream Flow Releases, No Tribal Irrigation Development, No Further Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	54,300	56,100	56,700	57,200	58,900	62,200	50,400	57,900	74,300	71,500	60,700	57,200	59,775
Median	60,000	63,300	64,300	64,300	65,700	71,700	58,400	65,000	80,300	80,300	67,400	65,300	65,075
80th	45,400	45,100	45,100	45,200	45,400	48,200	29,400	30,200	79,000	70,700	56,200	50,800	51,400
60th	56,300	56,800	57,100	57,100	62,100	68,900	50,200	57,200	80,300	79,400	65,400	59,500	60,975
40th	61,700	65,700	66,100	67,700	71,500	77,800	61,700	80,300	80,300	80,300	68,600	66,300	67,450
20th	71,300	74,400	76,000	76,700	80,300	80,300	69,200	80,300	80,300	80,300	72,600	70,600	74,658
Maximum	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	78,358
Minimum	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	15,300	2,300	1,500	1,500	2,716

TABLE E-4 *continued:* **Tongue River Reservoir Modeled Operations**

Reservoir Elevations (feet) Instream Flow Releases, No Tribal Irrigation Development, No Further Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	3,420.2	3,420.8	3,421.0	3,421.2	3,421.8	3,422.9	3,418.7	3,421.4	3,426.6	3,425.8	3,422.4	3,421.2	3,422.0
Median	3,422.1	3,423.2	3,423.6	3,423.6	3,424.0	3,425.8	3,421.6	3,423.8	3,428.4	3,428.4	3,424.6	3,423.9	3,423.8
80th	3,416.7	3,416.5	3,416.5	3,416.6	3,416.7	3,417.8	3,408.5	3,409.0	3,428.0	3,425.5	3,420.8	3,418.8	3,419.1
60th	3,420.9	3,421.0	3,421.1	3,421.1	3,422.8	3,425.0	3,418.6	3,421.2	3,428.4	3,428.1	3,423.9	3,422.0	3,422.4
40th	3,422.7	3,424.0	3,424.2	3,424.7	3,425.8	3,427.6	3,422.7	3,428.4	3,428.4	3,428.4	3,424.9	3,424.2	3,424.6
20th	3,425.7	3,426.6	3,427.1	3,427.3	3,428.4	3,428.4	3,425.1	3,428.4	3,428.4	3,428.4	3,426.1	3,425.5	3,426.7
Maximum	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,427.8
Minimum	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,397.4	3,377.2	3,374.4	3,374.4	3,374.4

Reservoir Contents (acre-feet) 18,200 acre-feet of Tribal Irrigation Development, Instream Releases, No Further Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	46,900	48,900	49,600	50,200	52,200	56,300	45,300	51,500	71,100	68,000	54,800	50,300	53,758
Median	53,100	56,600	58,500	58,500	58,900	64,900	50,900	60,200	80,300	77,900	62,600	58,000	59,933
80th	30,600	30,500	30,500	30,600	30,800	37,200	20,200	19,500	64,200	67,100	47,500	36,700	40,600
60th	45,200	48,700	49,400	50,300	51,700	60,000	43,900	45,800	80,300	74,000	60,100	51,400	55,016
40th	55,700	59,900	60,300	61,300	66,000	68,500	58,200	71,300	80,300	80,300	64,300	60,800	62,666
20th	65,900	69,000	70,100	71,200	76,300	80,300	68,400	80,300	80,300	80,300	67,300	65,900	70,483
Maximum	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	80,300	77,050
Minimum	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500

Reservoir Elevations (feet) 18,200 af of Tribal Irrigation Development, Instream Releases, No Further Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	3,417.3	3,418.1	3,418.4	3,418.6	3,419.4	3,420.9	3,416.6	3,419.1	3,425.7	3,424.8	3,420.4	3,418.6	3,420.0
Median	3,419.8	3,421.0	3,421.6	3,421.6	3,421.8	3,423.8	3,418.9	3,422.2	3,428.4	3,427.7	3,423.0	3,421.4	3,422.1
80th	3,409.3	3,409.2	3,409.2	3,409.3	3,409.4	3,412.9	3,401.9	3,401.4	3,423.5	3,424.5	3,417.5	3,412.6	3,414.6
60th	3,416.6	3,418.0	3,418.3	3,418.6	3,419.2	3,422.1	3,416.0	3,416.8	3,428.4	3,426.5	3,422.2	3,419.1	3,420.4
40th	3,420.7	3,422.1	3,422.2	3,422.6	3,424.1	3,424.9	3,421.5	3,425.7	3,428.4	3,428.4	3,423.6	3,422.4	3,423.0
20th	3,424.1	3,425.0	3,425.4	3,425.7	3,427.2	3,428.4	3,424.9	3,428.4	3,428.4	3,428.4	3,424.5	3,424.1	3,425.5
Maximum	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,428.4	3,427.4
Minimum	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4	3,374.4

TABLE E-5: Historic Streamflows (cfs) Below Tongue River Dam (Period From 1946-1989)

Historic Monthly Streamflows (cfs)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	258	245	191	176	187	238	379	944	1,438	562	370	306	441
Median	213	233	189	173	170	208	327	864	1,236	483	375	321	415
80th	157	148	149	132	143	128	188	470	667	367	271	190	320
60th	199	205	185	166	164	178	295	719	940	421	335	267	376
40th	288	258	194	183	183	245	383	986	1,539	551	395	346	482
20th	371	347	239	219	224	314	583	1,359	2,241	722	451	398	566
Maximum	509	506	369	287	592	676	958	2,714	3,752	2,083	767	687	851
Minimum	71	41	62	80	57	23	80	195	235	169	109	130	153

TABLE E-6: Streamflows During Construction Below Tongue River Dam

Monthly Streamflows During Construction (cfs)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Average	242	216	173	173	218	292	383	1,175	1,574	445	201	192
20th	303	258	216	209	278	374	526	1,649	2,707	622	305	284
50th	242	216	170	170	199	244	341	1,074	1,475	414	223	174
80th	190	186	138	124	143	191	262	634	635	224	65	97

TABLE E-7: Modeled Streamflows Below Tongue River Dam

Monthly Streamflows (cfs) Full Tribal Irrigation Development, No Further Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	268	168	154	153	193	246	323	1039	1551	512	353	269	436
Median	259	155	150	150	166	150	282	860	1429	424	354	255	408
80th	259	155	145	120	157	150	195	598	766	337	354	232	328
60th	259	155	150	150	166	150	227	764	1150	424	354	234	371
40th	259	155	150	150	166	159	304	1029	1526	428	354	274	426
20th	281	155	150	150	200	382	444	1449	2188	639	354	308	565
Maximum	392	479	413	330	643	782	662	3223	3546	1646	442	592	854
Minimum	207	133	102	89	85	85	163	520	366	317	13	92	209

TABLE E-7 *continued:* **Modeled Streamflows Below Tongue River Dam**

Monthly Streamflows (cfs) Full Tribal Irrigation Development, Full Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	267	155	143	128	137	119	202	636	782	377	335	232	293
Median	259	155	150	146	146	148	195	598	442	337	354	232	267
80th	259	155	132	107	121	78	187	525	442	337	354	232	255
60th	259	155	150	135	139	138	195	598	442	337	354	232	265
40th	259	155	150	150	160	150	195	598	657	385	354	247	295
20th	285	155	150	150	166	150	213	683	1227	424	354	279	348
Maximum	330	192	301	154	166	150	455	1130	2108	907	379	311	469
Minimum	190	143	73	0	0	0	99	285	123	62	24	13	154

Monthly Streamflows (cfs) No Tribal Development, Full Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	244	158	145	129	137	119	195	652	911	322	265	193	289
Median	236	155	150	146	146	148	185	498	667	255	270	178	287
80th	236	155	132	107	121	78	177	468	477	255	270	178	233
60th	236	155	150	135	139	138	185	468	588	255	270	178	254
40th	236	155	150	150	160	150	185	566	936	304	270	193	296
20th	262	155	150	150	166	150	200	861	1414	364	270	225	360
Maximum	307	298	301	155	166	155	456	1370	2190	908	294	360	475
Minimum	168	143	73	0	0	0	89	390	261	255	107	32	186

Monthly Streamflows (cfs) Instream Releases, No Tribal Irrigation Development, No Further Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	281	200	177	169	198	262	585	999	1,331	482	319	245	437
Median	272	190	189	181	189	190	600	789	1,083	379	324	242	403
80th	244	188	145	120	157	190	600	789	340	311	324	242	327
60th	272	190	176	169	184	190	600	789	933	325	324	242	367
40th	290	190	190	184	189	190	600	825	1,414	428	324	242	438
20th	327	190	190	190	189	382	600	1,223	2,165	620	324	242	551
Maximum	392	479	413	330	520	763	662	2,717	3,547	1,646	442	592	844
Minimum	143	133	102	89	85	85	84	439	340	310	99	76	223

TABLE E-7 *continued*: Modeled Streamflows Below Tongue River Dam

Monthly Streamflows (cfs) 18,200 af of Tribal Irrigation Development, Instream Releases, No Further Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	290	197	176	166	191	251	575	1,020	1,279	488	358	264	438
Median	285	190	189	181	189	190	605	862	1,000	371	371	272	409
80th	257	188	145	120	157	190	605	862	387	356	371	272	331
60th	285	190	176	169	184	190	605	862	792	371	371	272	366
40th	294	190	190	184	189	190	605	862	1,309	426	371	272	445
20th	338	190	190	190	189	361	605	1,209	2,165	595	371	272	554
Maximum	392	479	413	330	423	690	662	2,585	3,547	1,646	442	592	833
Minimum	98	133	102	89	85	85	84	508	387	264	73	76	228

TABLE E-8: Historic Streamflows at Miles City (cfs)

Historic Monthly Streamflows (cfs)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	262	276	206	209	307	580	491	764	1,404	480	190	212	448
Median	241	264	198	187	240	397	398	631	1,269	371	167	210	414
Q80	137	150	166	151	169	231	230	268	603	159	102	77	269
Q60	228	217	187	177	214	319	345	554	1,059	317	132	193	384
Q40	249	304	207	197	263	485	459	780	1,380	439	193	227	467
Q20	346	395	242	234	337	823	724	1,176	2,176	691	247	297	601
Maximum	694	566	423	501	1,795	1,782	1,692	2,982	3,825	2,207	699	598	986
Minimum	10	77	70	78	97	80	12	29	99	13	7	5	57

TABLE E-9: Modeled Streamflows at Miles City

Monthly Streamflows (cfs) Full Tribal Irrigation Development, No Further Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	229	190	167	184	306	584	412	675	1365	325	75	111	385
Median	210	180	166	154	207	338	321	543	1247	203	36	82	330
80th	156	150	133	130	178	229	182	244	597	29	16	32	244
60th	200	175	154	150	198	312	289	376	1010	159	28	61	302
40th	228	185	174	166	250	436	400	699	1363	333	59	101	370
20th	296	212	197	200	332	993	595	1016	1886	502	140	163	52
Maximum	746	556	366	533	1847	1855	1259	3332	3516	1670	382	437	912
Minimum	62	97	52	44	50	158	49	125	0	0	0	0	115

Monthly Streamflows (cfs) Full Tribal Irrigation Development, Full Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	226	178	156	159	252	455	291	276	598	200	67	84	245
Median	208	176	154	150	195	312	239	241	444	146	36	57	215
Q80	151	150	132	122	153	211	176	93	131	11	0	0	165
Q60	193	168	145	141	182	288	217	182	276	99	28	42	197
Q40	236	183	172	156	232	346	259	273	560	211	44	74	265
Q20	288	208	182	179	294	663	412	408	1,096	358	133	153	314
Maximum	678	269	254	354	1,204	1,228	822	1,237	2,077	932	319	360	527
Minimum	70	97	59	44	50	158	30	0	0	0	0	0	97

Monthly Streamflows (cfs) No Tribal Development, Full Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	226	175	155	158	250	455	296	418	807	215	68	89	276
Median	208	171	150	146	193	312	257	345	745	168	36	57	238
Q80	151	145	129	119	151	211	177	182	257	11	0	8	186
Q60	194	163	140	138	180	288	220	285	551	104	28	47	224
Q40	236	180	168	153	231	346	262	416	809	239	59	74	285
Q20	288	203	177	176	292	664	375	652	1,185	374	140	163	348
Maximum	678	370	249	351	1,201	1,228	822	1,604	2,160	1,013	319	360	571
Minimum	70	92	54	42	49	158	49	8	0	0	0	0	112

TABLE E-9 *continued:* **Modeled Streamflows at Miles City**

Monthly Streamflows (cfs) Instream Releases, No Tribal Irrigation Development, No Further Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	268	215	185	198	310	599	688	794	1246	387	135	151	431
Median	270	205	189	177	229	363	637	649	1037	303	109	123	371
Q80	172	165	142	132	182	251	572	506	232	99	67	81	287
Q60	251	197	169	171	200	348	619	595	889	208	101	109	347
Q40	290	213	195	192	265	477	681	724	1257	364	132	136	418
Q20	337	247	226	234	353	992	788	1,103	1,989	574	213	225	572
Maximum	787	550	361	532	1,722	1,854	1,335	2,985	3,619	1,770	486	503	949
Minimum	42	116	47	41	49	185	0	273	32	7	0	0	146

Monthly Streamflows (cfs) 18,200 af of New Tribal Irrigation Development, Instream Releases, No Further Wyoming Development

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Average	265	215	187	195	304	587	672	743	1,146	351	133	145	411
Median	268	208	182	179	229	363	632	649	889	223	109	114	354
Q80	172	168	143	132	182	251	570	506	190	85	67	67	270
Q60	251	200	171	172	200	345	614	595	647	177	101	103	327
Q40	290	213	195	194	254	477	681	688	1,172	316	132	131	404
Q20	327	244	228	236	353	992	788	958	1,942	530	213	225	542
Maximum	787	553	363	534	1,625	1,854	1,335	2,780	3,572	1,726	439	472	917
Minimum	2	119	49	42	49	185	0	273	32	0	0	0	143

Existing contracts for Tongue River Reservoir water are 40,000 afy: 32,500 afy for the Tongue River Water Users Association, and a 7,500 afy Northern Cheyenne contract. The Compact allocates up to an additional 20,000 afy of water to the Tribe. The sources of this water would be as follows:

1. 7,000 afy from existing excess reservoir capacity;

2. 7,000 afy from the increase in firm annual yield;

3. 5,000 afy from exchange water (Tribal return flows that could be used by other water users).

This would leave 1,000 afy which would fall under the shortage criteria outlined in the compact. Model results show that this water would be available to the Tribe during most years, but as the FAY analysis indicates, not during very dry years.

DOMINANT DISCHARGE

A common discharge event plays a crucial role in forming and maintaining stream channel characteristics such as channel width, channel depth, and meandering. This flow is known as the dominant discharge. This is defined as the bank-full capacity of the channel and is commonly found to range from the 2-year to the 10-year event.

Existing Condition

Table E-10 presents the average data for selected hydrologic parameters from nine cross-sections covering a 10-mile reach below the dam. Of particular interest is the split of flow between the left overbank, channel, and right overbank. From **Table E-10** it is concluded that the dominant discharge or bank-full capacity below the dam with 10 percent of the flow in the overbanks is about 13,000 cfs or the pre-dam (inflow) 10-year flood.

The 100-year peak outflow from the existing spillway is about 10,000 cfs, less than the dominant discharge. Therefore, since the completion of the dam, the river below has not been subjected to flows equal to or greater than the dominant discharge or bank-full capacity. This condition alone would tend to support a decreasing channel size. However, there are a number of offsetting conditions that have acted to counter this. (Additional evidence would have to be gathered to support and quantify these offsetting conditions.) The offsetting conditions that have tended to stabilize the downstream channel are:

1. Construction of the Tongue River Dam has effectively trapped sediment inflows within the reservoir. However, there is a substantial drainage area and sediment supply downstream of the dam. The reservoir provides sufficient settling time by means of its volume to trap a large percentage of the inflow sediment load.

2. Condition 1 produces discharges from the reservoir that are nearly free of sediment. Moving water has a propensity to carry sediment and sediment-free water searches for sediment to transport. Stated differently, a given flow regime (e.g., depth, velocity) has a given sediment transport capacity that it seeks to satisfy. Therefore, sediment-free discharges from the dam would tend to scour the pre-dam stream channel, resulting in down-cutting and widening of the historic channel. However, this condition has been offset to some extent because the existing spillway has reduced the 10-year flood peak to 43 percent of the pre-dam or inflow flood peak. Therefore, the flow regime has less capacity to transport sediment. In addition, the channel may be intermittently armored to withstand the scour potential of the reduced flood flows. Finally, the duration of flows at 13,000 cfs has been reduced by the combination of the existing spillway and reservoir storage.

The duration of flows under existing conditions is shown in **Table E-11**. The existing project does not discharge flows approaching the dominant discharge until events greater than the 100-year flood. The duration of maximum flows during the 500-year event is reduced from 15 hours for the pre-dam (inflow) condition to 8 hours for the existing spillway condition. These comparisons are shown on **Table E-11**.

From the available data, it appears that the channel immediately downstream from the dam has been altered to a minor degree beyond normal changes since the completion of the dam. In general, all meandering stream channels such as the Tongue River are constantly changing. The response of these stream channels to flood flows, sediment loads, vegetation, and climate is dynamic (constantly changing).

TABLE E-10: Average Flood Data for River Below Dam at Six Flood Flows

Flow Total	Flow Lob	Flow Channel	Flow ROB	Channel Depth	Top Width	Channel Area	Velocity Channel
9,994	253	9,324	417	10.5	361	2,042	5.6
13,108	428	11,863	817	11.5	416	2,466	6.3
17,646	775	15,338	1,533	13.0	464	3,110	7.0
21,377	1,118	18,031	2,228	14.2	495	3,647	7.3
25,410	1,581	20,835	2,994	15.2	549	4,188	7.8
35,896	2,999	27,692	5,205	17.6	575	5,484	8.6

Source: Morrison-Maierle/CSSA 1994.

TABLE E-11: Duration of Flow at 13,000 cfs for Existing Spillway at Six Flood Recurrence Intervals

Recurrence Interval	Pre-Dam Duration at 13,000 cfs, *hours*	Existing Spillway Duration at 13,000 cfs, *hours*
5-year	0	0
10-year	1.0	0
25-year	6.5	0
50-year	9.5	0
100-year	11.5	0
500-year	15.0	8.0

Source: DNRC 1994.

Labyrinth Weir Alternative

The dominant discharge of 13,000 cfs would be equal to the outflow from the 25-year flood under the labyrinth weir alternative. When compared to the existing spillway, this alternative would increase the number of 13,000 cfs events in the downstream channel. Instead of an average of one 13,000 cfs event every 100+ years, there would be an average of four 13,000 cfs events every 100 years. **Table E-12** shows that during the 25-year flood, the duration of flow at 13,000 cfs for the labyrinth weir spillway alternative is 3.5 hours and the duration for the existing spillway is 0 hours. Under the labyrinth weir alternative, the bed and bank scouring potential could increase noticeably in comparison to the existing spillway in a confined reach of the river below the dam.

TABLE E-12: Duration of Flow at 13,000 cfs for Labyrinth Weir at Six Flood Recurrence Intervals

Recurrence Interval	Existing Spillway Duration at 13,000 cfs, *hours*	Labyrinth Duration at 13,000 cfs, *hours*
5-year	0	0
10-year	0	0
25-year	0	3.5
50-year	0	8.0
100-year	0	10.5
500-year	8.0	16.0

Source: DNRC 1994.

RCC Spillway Alternative

The dominant discharge of 13,000 cfs would represent an event greater than the 100-year flood under the RCC spillway alternative. This alternative would be approximately equal to the existing condition as demonstrated on the hydrographs in **Table E-13**. The RCC spillway alternative reduces the common inflow floods (channel-forming floods) to less than the dominant discharge in a manner similar to the existing spillway.

TABLE E-13: Duration of Flow at 13,000 cfs for RCC Spillway at Six Flood Recurrence Intervals

Recurrence Interval	Existing Spillway Duration at 13,000 cfs, *hours*	RCC Spillway Duration at 13,000 cfs, *hours*
5-year	0	0
10-year	0	0
25-year	0	0
50-year	0	0
100-year	0	0
500-year	8.0	6.0

Source: DNRC 1994.

DAM BREACH ANALYSES

Two scenarios were evaluated to determine the extent of the downstream area that would be flooded in the event of a Tongue River Dam breach. The first scenario was the clear-weather breach, or a sudden breach that would occur as the result of an earthquake or a piping failure. The second scenario was that the dam would breach when 4 feet of water was going over the spillway during the routing of the PMF on the Tongue River.

The hydrology/hydraulics study of Tongue River Dam entailed determining a PMP for the area and the resultant PMF[1]. PMPs of 9.9 inches in 6 hours, 15.4 inches in 24 hours, and 19.8 inches in 72 hours were adopted. The combined contribution from snowmelt and baseflow, used with the flood resulting from the PMP, was assumed to be

the maximum flood of record during the months when the PMP is most likely to occur (May 1978). The resultant PMF has a calculated peak flow of 382,000 cfs and a 10-day volume of 1,320,000 acre-feet.

The flood hydrographs resulting from the two breach scenarios were routed downstream using the National Weather Service and BOSS DAMBRK models. Both breach floods were routed downstream to a point just below Miles City. The model estimates that the clear-weather breach flood would attenuate to approximately 78,000 cfs at Miles City. The model estimates that the PMF breach flood would discharge more than 369,000 cfs at Miles City. The predicted time of arrival of the flood, however, if more than 24 hours after the breach starts to develop. By then, disaster officials would have had time to make real-time estimates of actual flood characteristics and to update warnings to people likely to be affected by the flood. The flood inundation area for the PMF breach flood is mapped from the dam to Miles City. The flooded areas for both breach scenarios are mapped in the Miles City area.

The clear-weather breach was begun with the reservoir full to the spillway crest. The PMF breach was begun when 4 feet of water started to flow over the spillway, approximately 4 hours after the flood first reached Tongue River Reservoir. Final model efforts used a breach development time of 2.0 hours, breach bottom width of 350 feet, and breach side slopes of 0.5 horizontal to 1.0 vertical. The bottom of the breach was assumed to reach elevation 3,351.4 feet.

The computer model used to estimate the flow, stage, and timing of the dam breach flood provides a mathematical tool to model and approximate real-life characteristics of a flood. The model has been used to recreate the results of real floods from breached dams with some degree of confidence. The results of the model presented herein, however, should be viewed only as an approximation of what actually may occur. Depending on the actual conditions at the time of the flood, more or less area may be flooded, the flood wave may travel faster or slower, and the water depth may vary from that predicted. Therefore, **Tables E-14 and E-15** and the inundation maps should be used only as a guideline for where and when to evacuate people in the event that Tongue River Dam should breach. The locations of the cross sections are shown in **Table E-16**.

TABLE E-14: Tongue River Dam Breach Characteristics

CLEAR WEATHER BREACH (CWB) SCENARIO

Cross Section (#)	Distance From Dam (*miles*)	Peak Wave Discharge (*cfs*)	Travel Time Velocity (*fps*)	Initial (*hrs*)	Wave Peak (*hrs*)	Height (*ft*)
1	0.0	455,416	9.1	9.1	1.5	56.2
4	3.9	410,210	11.4	0.9	1.9	46.8
9	12.4	326,310	11.1	2.1	3.2	40.5
13	19.9	268,029	7.0	3.5	4.4	24.0
14	21.7	253,706	6.5	3.8	4.7	26.9
15	23.6	236,421	6.8	4.2	5.1	24.1
16	29.1	193,388	6.9	5.4	6.5	29.1
18	33.1	172,831	5.3	6.3	7.5	27.5
24	0.4	153,127	7.9	8.0	9.5	41.4
32	56.6	129,871	8.5	11.8	13.4	21.0
35	62.0	123,166	7.0	13.5	14.9	21.3
39	74.6	105,982	8.2	16.1	18.6	22.5
42	88.9	98,471	7.1	19.8	22.2	25.2
44	95.6	93,128	8.1	21.2	24.0	24.1
46	106.7	87,406	7.3	23.6	27.3	21.3
51	125.6	80,388	6.4	28.5	32.7	23.2
52	129.5	78,938	6.9	29.6	34.1	25.4
53	130.3	78,819	9.5	29.7	34.2	28.9
54	131.3	78,405	3.5	30.0	34.5	13.9
55	135.3	74,766	5.8	31.5	36.8	14.0
56	137.3	74,269	5.9	32.0	37.4	12.7

Source: DNRC 1992.

TABLE E-15: Tongue River Dam Breach Characteristics

Probable Maximum Flood (PMF) Scenario

Cross Section (#)	Distance From Dam (*miles*)	Peak Wave Discharge (*cfs*)	Travel Time Velocity (*fps*)	Initial (*hrs*)	Wave Peak (*hrs*)	Height (*ft*)
1	0.0	735,863	10.8	4.5	8.4	67.5
4	3.9	644,226	12.5	4.7	8.8	57.0
9	12.4	565,521	12.9	8.0	9.9	51.2
13	19.9	521,834	8.6	9.8	11.0	32.1
14	21.7	504,339	8.3	10.1	11.3	37.1
15	23.6	486,395	8.8	10.4	11.6	34.6
16	29.1	431,564	7.2	11.4	12.6	40.4
18	33.1	408,982	6.4	12.0	13.5	35.1
24	40.4	376,545	9.2	13.2	15.5	61.0
32	56.6	374,814	9.8	16.6	18.5	40.0
35	62.0	374,440	7.9	17.7	19.5	31.5
39	74.6	373,418	9.2	20.0	22.2	34.3
42	88.9	372,367	8.4	22.8	25.2	40.1
44	95.6	371,531	9.6	24.0	27.0	39.1
46	106.7	370,951	8.5	26.1	29.3	32.9
51	125.6	369,621	7.5	30.5	32.0	38.4
52	129.5	369,402	8.2	31.3	32.9	34.6
53	130.3	369,386	13.8	31.5	33.0	36.9
54	130.3	369,149	4.5	31.8	33.3	23.3
55	135.3	367,681	6.5	33.0	35.3	25.9
56	137.3	367,424	7.2	33.5	35.9	26.7

Source: Department of Natural Resources and Conservation 1992.

TABLE E-16: Cross Section Locations

Number	Location
1	Tongue River Dam
4	Intermediate Ranch
9	Four Mile Creek
13	4D Ranch
14	McKinney Ranch
15	Brewster Ranch
16	Quarter Circle U Ranch
18	Birney
24	Birney Day School
32	Ashland
35	Stebbins Creek
39	Brandenberg
42	H.S. School
44	Above Garland School
46	Plunket Creek
51	Cowles Creek
52	Calvary Cemetery
53	Interstate 94
54	Pine Hills School
55	Below Sewage Ponds
56	Sunset Memorial Gardens

Source: DNRC 1994.

Appendix F

SPECIES LISTS

Table F-1: Breeding Status of the Bird Species Observed on the Tongue River Dam Area (Martin et al. 1981)

Species	Breeding Status *
Common loon	M
Eared grebe	M
Western grebe	t
Pied-billed grebe	M
White pelican	t
Double-crested cormorant	B
Great blue heron	B
Canada goose	B
White-fronted goose	M
Mallard	B
Gadwall	M
Pintail	M
Green-winged teal	M
Blue-winged teal	M
Cinnamon teal	M
American widgeon	b
Northern shoveler	M
Wood duck	t
Redhead	M
Ring-necked duck	M
Canvasback	M
Lesser scaup	M
Common goldeneye	M
Bufflehead	M
Surf scoter	M
Ruddy duck	M
Common merganser	M
Turkey vulture	b
Goshawk	M
Red-tailed hawk	B
Swainson's hawk	M
Rough-legged hawk	W
Golden eagle	B
Bald eagle	W
Marsh hawk	b
Osprey	B
Prairie falcon	B
Peregrine falcon	M
American kestrel	b
Sharp-tailed grouse	B
Sage grouse	b
Ring-necked pheasant	b
Turkey	B
Wilson's phalarope	M
Ring-billed gull	V
Franklin's gull	V
Caspian tern	M
Black tern	V
Mourning dove	b
Black-billed cuckoo	b
Screech owl	b
Great-horned owl	B
Short-eared owl	t
Poor-will	b
Common nighthawk	b
White-throated swift	b
Belted kingfisher	b
Common flicker	b
Red-headed woodpecker	b
Hairy woodpecker	b
Eastern kingbird	b
Western kingbird	b
Cassin's kingbird	b
Say's phoebe	b
Least flycatcher	b
Western wood peewee	b
Horned lark	b
Violet-greet swallow	b
Tree swallow	b
Bank swallow	b
Ban swallow	b
Cliff swallow	B
Black-billed magpie	b
Common crow	t
Pinyon jay	b
Clark's nutcracker	t
Black-capped chickadee	b
White-breasted nuthatch	b
Red-breasted nuthatch	b
House wren	b
Rock wren	b
Gray catbird	b
Brown thrasher	b
Sage thrasher	b
American robin	b
Mountain bluebird	b

Table F-1 *continued:* Breeding Status of the Bird Species Observed on the Tongue River Dam Area (Martin et al. 1981)

Species	Breeding Status *	Species	Breeding Status *
American coot	b	Townsend's solitaire	b
Yellow warbler	b	Bohemian waxwing	W
Yellow-rumped warbler	b	Cedar waxwing	t
Common yellowthroat	b	Loggerhead shrike	b
Yellow-breasted chat	b	Starling	b
Western meadowlark	b	Solitary vireo	b
Yellow-headed blackbird	t	Warbling vireo	b
Red-winged blackbird	b	Killdeer	b
Northern oriole	B	Spotted sandpiper	b
Brewer's blackbird	b	Solitary sandpiper	M
Common grackle	b	Lesser yellowlegs	M
Brown-headed cowbird	b	Semipalmated sandpiper	M
Western tanager	b	American avocet	M
Black-headed grosbeak	b	Vesper sparrow	b
Lazuli bunting	b	Lark sparrow	b
American goldfinch	b	Chipping sparrow	b
Red crossbill	b	Brewer's sparrow	b
Rufous-sided towhee	b	White-crowned sparrow	M
Lark bunting	b	Song sparrow	b

Source: U.S. Fish and Wildlife Service 1992.
* *B: confirmed breeding (nest or dependent young observed)*
b: suspected breeding (present during breeding season)
V: visitor (breeds nearby, but not on the study area)
t: present but no evidence of breeding
W: winter resident and migrant only
M: migrant only

Table F-2: Mammals Observed on the Tongue River Dam Study Area (Martin et al. 1981)

Common Name	Scientific Name
Raccoon	Procyon lotor
Striped skunk	Mephitis mephitis
Coyote	Canis latrans
Red fox	vulpex vulpex
Yellowbelly marmot	Marmota flaviventris
Thirteen-lined ground squirrel	Spermophilus tridecemlineatus
Least chipmunk	Eutemias minimus
Red squirrel	Tamiasciurus hudsonicus
Northern pocket gopher	Thomomys talpides
Beaver	Castor canadensis
Western harvest mouse	Reithrogontomys megalotis
Deer mouse	Peromyscus maniculatus
Northern grasshopper mouse	Onychomys leucogaster
Bushytail woodrat	Neotoma cinerea
Muskrat	Ondatra zibethicus
Porcupine	Erethizon dorsatum
Desert cottontail	Sylvilagus audubonii
Mule deer	Odocoileus hemionus
Whitetail deer	Odocoileus virginianus
Pronghorn antelope	Antilocapra americana

Source: U.S. Fish and Wildlife Service 1992.

TABLE F-3: Amphibians and Reptiles Observed on the Tongue River Dam Area (Martin et al. 1981)

Common Name	Scientific Name
Leopard frog	Rana pipiens
Northern chorus frog	Pseudacris triseriata
Snapping turtle	Chelydra serpentina
Short-horned lizard	Phrynosoma douglassi
Racer	Coluber constrictor
Bull snake	Pituophis melanolencas
Prairie rattlesnake	Crotalus viridus

Source: U.S. Fish and Wildlife Service 1992.

TABLE F-4: Fishes Collected in the Tongue River Reservoir (Elser et al. 1977)

Common Name	Scientific Name
Northern pike	Esox lucius
Carp	Cyprius carpio
Goldfish	Carassius auratus
Golden shiner	Notemigonus crysoleucas
Shorthead redhorse	Moxostoma macrolepidotum
White sucker	Catostomus commersoni
Longnose sucker	Catostomus catostomus
Black bullhead	Iictalurus melas
Yellow bullhead	Ictalurus natalis
Channel catfish	Ictalurus punctatus
Stonecat	Noturus flavus
Largemouth bass	Micropterus salmoides
Smallmount bass	Micropterus dolomieui
Rock bass	Ambloplites rupestris
Green sunfish	Lepomis cyanellus
Black crappie	Pomoxis nigromaculatus
White crappie	Pomoxis annularis
Pumpkinseed	Lepomis gibbosus
Sauger	Stizostedion canadense
Walleye	Stizostedion vitreum
Yellow perch	Perca flavescens
Brown trout	Salmo trutta
Rainbow trout	Salmo gairdneri
Spottail shiner	Notropis hudsonius

Source: U.S. Fish and Wildlife Service 1992.

Appendix G

ENVIRONMENTAL COMMITMENTS

This appendix lists the environmental commitments found in the EIS in **Chapters 2 and 4** and in **Appendix B, *Biological Assessment*.**

AIR QUALITY

1) Airborne particulates from roads will be mitigated by using watering trucks and/or calcium chloride and periodic grading.

2) Dust from concrete batching and aggregate excavation and hauling will be controlled by watering.

3) Disturbed areas will be reclaimed to reduce particulates.

4) Wind blown particulates from construction will be mitigated by reducing the time disturbed areas are exposed to wind and sun.

5) Air quality monitoring will be used to evaluate effectiveness of dust control measures.

SOILS

1) About 3.5 miles of additional riprap are proposed along road and railway embankments to protect against soil erosion. Where applicable, vegetative cover and other means of shoreline stabilization will be considered.

2) Soil compaction will be alleviated by tillage.

3) Disturbed areas will be recontoured and revegetated.

4) Topsoil will be stockpiled, and disturbed areas reseeded and mulched.

5) Soil erosion hazard after reclamation may be reduced by maintenance including: mulching, access control, soil replacement, seedbed preparation, and general reclamation techniques.

WILDLIFE

1) Establish a wildlife management area encompassing 600 to 1,000 acres of suitable project lands and lands to be acquired for the mitigation of woody and herbaceous riparian wildlife habitat lost due to the project. The wildlife management area could be established by acquisition of land through fee title or easement and may be developed and managed in conjunction with the enhancement measures presented in ***Fish and Wildlife Habitat Enhancement Features***. Areas currently being investigated for wildlife management purposes are located throughout the entire Tongue River Basin.

   The wildlife management area will include up to 200 acres of naturally established wetlands, up to 50 acres of newly constructed wetlands, up to 250 acres of riparian vegetation, and 328 acres of grassland and scrub forest.

2) Renovate and improve the Pike Pond waterfowl impoundment located in Section 15, T9S, R40E, (**see Figure 2-4**) in order to preserve its existing wildlife habitat. A portion of this proposal is a component of the wetlands mitigation plan discussed in **Section 2.3.9.6**.

AQUATICS AND FISHERIES

1) A supplemental walleye stocking program will be initiated for Tongue River Reservoir following refilling, using 10,000 8-inch yearling fish annually, for a 2-year period. Costs are estimated to be $20,000 for the entire stocking program ($16,000 for the fish and $4,000 for transporting them from an available source).

2) A program to monitor, and possibly restock, the spottail shiner population in Tongue River Reservoir will be established. Monitoring would cost about $1,000, while restocking, if required, would cost about $4,000 over a 2-year period.

3) A program to monitor and possibly restock smallmouth bass will be established for the reach of Tongue River between the dam and Ashland. Monitoring will cost an estimated $3,600 while restocking, if required, would cost about $38,400. A one-time stocking of 128,000 2-inch fingerling smallmouth bass would be conducted if necessary.

4) A supplemental smallmouth bass and channel catfish stocking program will be initiated in the reach of Tongue River between Ashland and the T&Y Diversion Dam if determined to be necessary. The one-time introduction of 155,000 2-inch fingerling smallmouth bass and 77,500 2-inch fingerling channel catfish will

be conducted after project construction and restoration of normal streamflows. Total cost is estimated at $52,000.

5) Provision will be made in an agreement, or other suitable instrument, between the project sponsors and DFWP for mitigating the impacts of fishery resources of any unanticipated events, such as a drastic winter-kill during reservoir drawdown or an emergency or other short-term shutdown of water releases at the dam during project rehabilitation. Restocking, water pumping (to provide fish survival flows in the river), or other costs will be included among project costs for fishery mitigation.

6) To minimize impacts to downstream aquatics, DFWP will monitor the condition of the river downstream of the dam during construction of the project. A target release of run-of-river flows or up to 190 cfs would be maintained during the construction period with the exception of low flows during installation of the low level outlet works. The minimum flow released will be 75 cfs. If excess streamflow allowed, releases beyond maintenance level would be made in mid-May to September to facilitate spawning runs of warm-water species and provide improved aquatic habitat. DNRC's current monitoring of Tongue River flows at Miles City will continue following construction.

7) The rainbow trout population will be restocked in the Tongue River downstream of the reservoir.

ADDITIONAL HABITAT MITIGATION

1) Reservoir levels will be maintained at the highest possible elevation at all times during the construction period. These levels will be governed by safe operating limits for the reservoir, as well as water for contract holders and other needs.

2) To maintain instream flows during critical periods during construction, funds would be made available in the project budget to lease water from willing agricultural water users, provided the state has in place a monitoring and enforcement program to stop lower priority diversions.

3) To replace habitat lost to inundation, the project sponsors will conduct a planting program above the new high water mark in suitable areas to mimic or enhance existing riparian conditions to expedite reestablishment of riparian communities and diversify existing habitat where feasible.

4) Regeneration of cottonwood and willow stands from existing seed sources will be enhanced by site preparation. Timing of preparation with the relatively short duration of seed viability is critical.

5) Riparian zones will be improved by fencing cattle out of critical areas along the reservoir, restricting campers to designated areas, instituting programs to eradicate salt-cedar from the reservoir vicinity, and controlling noxious weeds.

6) Clearing woody vegetation will be limited in the new pool area to areas critical for safety or dam operations. Existing willows will be left wherever possible to speed the reestablishment of forage fish and juvenile predators after the construction drawdown. Large cottonwoods killed by the new pool will be left wherever possible to provide nesting and perching habitat.

7) Reclamation of disturbed areas will be conducted according to a weed control plan developed by the project sponsors in consultation with county weed districts and in compliance with the Noxious Weed Control Act.

WETLANDS

About 314 acres of wetlands around the reservoir will be affected by the project. Of this loss, wetlands that do not naturally regenerate will be replaced by wetlands similar in function and value (**see *Wildlife* section**).

THREATENED, ENDANGERED, AND CANDIDATE SPECIES

Mitigation for Threatened and Endangered species are listed below by species, followed by mitigation for candidate species. If any Threatened and Endangered species were encountered during construction, activities would cease and consultation would take place with USBR and USFWS.

Bald Eagle

(1) At a minimum, second option planning as delineated in the **"Montana Bald Eagle Management Plan, July 1994"** (Management Plan) will be applied for the nest site 2.5 miles downstream of the dam and any others identified in the project area. This approach defines 3 concentric nest-site management zones around the nest. For each zone there is a set of guidelines for managing activities in that zone, with restrictions generally decreasing as distance from the nest increases. Under this planning scenario the outer-most zone extends 2.5 miles from the nest.

If as a result of final design considerations, construction activities are proposed which would abrogate guidelines set forth in the Management Plan, third or fourth option planning would be conducted to determine if the proposed activities would be allowable. These planning options involve a researched, site-specific approach to define which specific areas are being used by the eagles.

The following measures will be applied to augment or supplement the guidelines contained in the Management Plan.

(2) Prohibit usage of the county road adjacent to the nest site for project-related traffic during the February 1 to August 15 period for each year of construction. Project-related traffic includes, but is not limited to: trucks and heavy equipment. Commuting workers would be encouraged to avoid the area.

(3) Monitor the project area, with emphasis on the upper river, for nesting bald eagles or adult eagles exhibiting nesting behavior each spring and continuing through the completion of dam rehabilitation activities.

(4) Monitor upper project area (reservoir and approximately 5 miles downstream) for bald eagle presence and use during fall, winter and spring of each construction season. Ice conditions in the river should be monitored during low flow periods to ensure that sufficient open water exists to attract waterfowl. If it does not, flows in the river would be increased to accomplish this. If storage water is not available for this purpose the project sponsors will contact USFWS to determine what other measures may be needed to minimize or eliminate impacts to the bald eagle.

(5) Post and enforce vehicle speed limits in the reservoir area including the downstream construction area to lessen the risk of vehicle collisions with big game. The combination of less carrion and lower speeds will reduce the risk of bald eagle/vehicle collisions.

(6) Employ high construction standards and rigid safety precautions to minimize the potential for an accidental spill or discharge of any chemical or petroleum product. Additionally, spill control plans/ measures will be in place prior to the beginning of construction.

7) Any new powerlines will be "raptor-proofed" in accordance with USFWS practices to minimize mortality from collisions or electrocution.

Peregrine Falcon

(1) Items 4, 5, and 6 described under bald eagle are applicable to the peregrine falcon.

(2) The project area will be surveyed for peregrine falcons during the spring, summer and fall prior to the beginning of construction activities. If peregrines are documented in the project area, a determination will be made at that time regarding potential impacts of specific construction activities and the need for additional coordination measures.

Piping Plover and Least Tern

(1) The surveys conducted in 1991 in conjunction with preparation of the CAR are considered coordination measures to reduce potential adverse impacts to piping plovers and least terns. The reservoir area will be surveyed in the spring and summer, and during the construction drawdown to determine if either of these species has begun to use the area. If nesting birds are located during these subsequent surveys, consultation with USFWS will immediately be re-initiated.

Pallid Sturgeon

(1) The surveys conducted in 1991 in conjunction with preparation of the CAR for this project are considered to be coordination measures to reduce potential adverse impact to the pallid sturgeon. If other evidence of the existence of this species in the project area, such as an incidental catch by a fisherman or collection by DFWP during electroshocking or netting arises, consultation with USFWS will immediately be re-initiated.

Black-footed Ferret

(1) A ferret survey will be conducted prior to implementing any enhancement measures that will negatively affect prairie dog towns exceeding an 80-acre threshold delineated in the USFWS's "Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act," (1989).

(2) If ferrets are discovered, consultation with USFWS will be immediately re-initiated.

Category 1 & 2 Candidate Species

(1) Items 5 and 6 described under the bald eagle also apply to candidate species.

(2) Information will be collected on candidate species in the project area in conjunction with the implementation of the enhancement measures and other project activities to aid in the understanding of the ecology of these species and determine how future project operations may affect these species.

RECREATION

Mitigation for impacts to recreation from the project are divided into: general measures, measures for Campers Point, and measures for the fishing access site below the dam.

General

1) About 3,000 feet of new or relocated internal park roads will be built to accommodate the new water level and park facilities. About 5,600 feet of existing internal roads will be reclaimed.

2) The existing 100-foot-by-50-foot man-made sand beach at Sand Point will be replaced or relocated above the new water line.

3) A new 200-foot-by-24-foot boat ramp will be built at Campers Point to replace the existing ramp that will be inundated.

4) A new 80,000-square-foot parking area at the ramp will be developed to accommodate boat launching and removal.

5) A concession building at Campers Point will be located above the new water line.

6) A new well and septic system will be developed to replace the existing facility at Campers Point.

7) Eighteen single latrines (handicap accessible) will replace 11 existing single and three double latrines.

8) Eleven new picnic shelters will replace nine existing shelters.

9) About 7,600 linear feet of shoreline at recreation sites will be revegetated at full pool.

10) Thirty fire rings will be replaced or relocated to areas suitable for camping and/or day use.

Recreation mitigations will be implemented during the construction and reclamation phase of the project.

Campers Point Mitigation

1) Closure of camping areas, the boat ramp, and marina facilities at Campers Point will occur no earlier than September 3, 1996 following the Labor Day holiday weekend.

2) Public information signs will be erected at major access points to the state park prior to Memorial Day weekend of 1996, informing the public of upcoming closures at the park and areas of the park available for public use.

3) Public access to camping areas at Rattlesnake Point and Sand Point will be maintained until November 1 (or ice-up) of 1996. Portions of PeeWee Point will be open for public use depending on construction requirements for the alternate boat ramp.

4) An alternate concrete boat ramp for public access will be provided at the time of closure of the Campers Point boat ramp.

5) Marina services (gasoline, groceries, ice, and potable water) will be provided to the public at the existing location or a new location during park reconstruction through the 1997 recreation season.

6) Planned mitigation and park improvements for Campers Point will begin during the first construction season following the completion of aggregate mining and continue as necessary through the construction season of 1998. Parts of the state park at Rattlesnake, PeeWee, and Sand Points and possibly Campers Point will remain open for public use during the completion of park improvements.

7) The mining and reclamation plans for Campers Point will result in a shallow-water bay. The accessibility of this bay to boats during all summers will depend on final reservoir operation plans and the extent of future Tribal and Wyoming water use. Reclamation plans will include movement of overburden to shape the bay and provide adjacent shoreline areas for recreation and marina activities, stabilization of banks to decrease erosion potential from waves, providing a bay subsurface and perimeter free of obstacles for boaters, and ensuring no creation of stagnant pools within the bay during extremely low water. A ridge formed by mining along the southeast edge of the pit will be either removed, filled to above high water line, or otherwise modified to minimize a potential navigation hazard.

8) The segment of existing County Road 380 located within Rattlesnake, Campers, PeeWee, and Sand Points will be downgraded to an internal park road or reclaimed as indicated on the final park design.

9) Stockpiles of overburden, topsoil, and aggregate necessary for dam reconstruction, planned park improvements, and construction of County Road No. 380 will be located to the greatest extent possible in areas to be disturbed by construction activities. Existing vegetation located in areas of the park that will be undisturbed by mining or planned park improvements will be preserved to the greatest extent possible.

10) The Project will reimburse DFWP for revenue lost as a result of activities related to project construction and park mitigation, but not for activities related to park enhancement.

11) DNRC will create, where feasible, pullouts and/or vehicular access from County Road 380 to near-shore areas north of Sand Point to the dam (such as Monument Creek).

Tongue River Fishing Access Site

1) DNRC and DFWP will identify during an on-site visit selected cottonwoods on the west side of the river to be protected during dam construction. The area surrounding these trees will be fenced to prohibit motorized access and protect their root structure during construction.

2) The reclamation plan for the staging area following construction will incorporate the following elements where determined feasible by DNRC and DFWP:

   - a revegetation plan that uses grasses, forbs, shrubs, trees and wetland species to restore preconstruction site conditions
   - site grading on the west side of the river that would create a parking area for 8-10 cars, a streamside approach for launching canoes and boats, and locations for future campsites
   - use of leftover aggregate from construction, if available, to gravel the parking area and other roads and approaches
   - providing for future public foot access to the reclaimed staging area east of the river if compatible with public safety and long-term maintenance requirements as determined by DNRC.

3) If the existing latrines are damaged or removed during construction as determined by DFWP and DNRC, two single latrines (handicap accessible) would be installed on the west side of the river.

4) If the existing picnic shelters are damaged or removed during construction as determined by DFWP and DNRC, two picnic shelters with concrete tables would be installed on the west side of the river.

TRANSPORTATION

1) County Road No. 380 will be relocated, and reconstructed. The relocation will be mostly complete before major material hauling to the dam site began, to safely accommodate recreational traffic.

2) From Aggregate Site No. 1 to the dam, local traffic on County Road No. 380 will be controlled either by signing or flagging if necessary during times of heaviest construction.

3) When construction at the dam site was complete, County Road No. 380's gravel will be replenished and regraded where needed, borrow pits will be cleaned and reshaped, damaged culverts will be cleaned and reshaped, and signs or other features repaired.

4) The intersection of County Road No. 380 and Secondary Highway 314 will be evaluated before construction began and monitored during construction to determine adequacy and safety for truck traffic. Measures to accommodate larger trucks will be implemented as required and may include widening of the intersection and moving existing traffic control signs.

5) Signing will be used to advise and warn the traveling public of heavy construction traffic on Secondary Highway 314 and County Road No. 380. All construction signing will be removed upon completion of this proposed action.

6) Speed restrictions of 15 MPH for trucks hauling materials through the residential area of Sheridan, Wyoming will be considered in consultation with area residents and city officials in the event that a rail load-out facility were used in Sheridan.

7) Dust control along County Road No. 380, in the construction staging area, and in Sheridan, Wyoming (in the event that the Sheridan rail load-out were used), will be conducted when necessary by sprinkling with water or application of a dust palliative such as magnesium chloride.

8) If necessary, hauling major construction materials may be restricted to 7:00 a.m. to 9:00 p.m. to avoid nighttime disturbance of residents in Sheridan, Wyoming and to campground users at the reservoir.

CULTURAL RESOURCES

Mitigation for cultural resources will be in accordance with a Memorandum of Agreement between USBR and the State Historic Preservation Office. Mitigation plans would be decided on in consultation with the Advisory Council on Historic Preservation, the Tribe, DNRC, and other appropriate parties.

APPENDIX H

SPILLWAY CREST CONTROL

The simplest form of control for a spillway is the free, or uncontrolled, overflow crest, which automatically releases water whenever the reservoir water surface rises above the crest level. The advantages of the uncontrolled crest are the elimination of the need for constant attendance and regulation of control devices by an operator and the risk associated with untimely attendance as well as the freedom from maintenance and repairs of the devices.

There are many types of movable spillway crest control devices or gates that are used to increase reservoir pool elevations so that additional water storage is available while providing additional spillway capacity for flood events. They range from flashboard systems to complex steel gates. All are generally expensive to install and maintain and are susceptible to vandalism.

One of the simplest and cheapest of the movable spillway crest control structures is flashboards. Flashboards are typically used when the spillway is not needed for releasing frequent floods. When crest control is required on a dam and frequent adjustment of the crest elevation is needed, other types of gates usually are installed.

The flashboard arrangement typically consists of wooden panels or planks that are supported by vertical posts placed on the crest of the spillway. These installations are normally temporary and are designed to be removed prior to large floods so that the full unobstructed spillway capacity is available. The flashboards may also be designed to fail at a certain overtopping depth, thus providing the full spillway capacity. Flashboards provide a simple and inexpensive type of movable crest device, and they have the advantage that an unobstructed crest is provided when the flashboards and their supports are removed. The ideal installation is where the spillway has minimal use, and large flood events are rare.

Removal of flashboards during a flood event is an important design consideration. The flashboard system must provide for a positive and certain ability to remove the flashboards. There are several ways to provide this assurance.

One is to design the flashboard structure so that the supports will only support a certain amount of pressure or water depth against the flashboards before they fail. This causes the flashboards and their supports to fall over and be washed down the spillway. This can cause a significant flood wave on top of the existing water surface, creating a danger to anyone downstream of the project. The flashboard system could not be replaced until the water receded and the reservoir level dropped to an elevation below the spillway crest.

When the flashboards are intended to fail at a predetermined reservoir pool elevation, the time of failure is uncertain. The failure may be at a higher or lower elevation than the design intends, depending on the materials used and how the actual strength of the material compares to the strength estimated during design. The care taken during installation and the subsequent maintenance also affects the actual strength of the flashboard system. When designed to fail, the flashboards and supports are lost during operation, which adds additional maintenance costs for the replacement of the flashboards.

A second way to remove flashboards is to simply pull them up and remove them when the flows reach a certain level. Once the threat of a flood passes, the flashboards are replaced. This method is commonly used in diversion dams with flashboards of limited height. However, once flows reach a depth of four to five feet, the boards become nearly impossible to remove. A misjudgment by the dam operator could easily result in a decision to remove the flashboards being made too late, resulting in a loss of spillway capacity. Specialized equipment would be needed to perform this operation from a bridge some 25 feet above the spillway crest.

This system requires numerous permanent piers and posts in the spillway crest. The piers would create a significant decrease in the spillway capacity and would require continuous observation and considerable maintenance during a flood event to ensure that logs, brush and other debris did not accumulate on the piers.

A third way to remove flashboards, the most positive method, is to provide removable flashboard posts. Typically these are steel "H" beams held in place with pins at one end and pads or other supports that can be removed at the other end. Removal of the supports allows the flashboard posts to fall free, releasing the flashboards. With such a system, only a few flashboards are released at once, minimizing any threat of sudden downstream flooding. Once the threat of flooding passes, the posts are put back in place and new flashboards are installed. Specialized equipment is needed to operate this system.

Central to the operation of any flashboard system on a major dam is a bridge above the spillway crest. The bridge must be high enough to allow floodwater to pass beneath it and strong enough to support the hoisting mechanism and other equipment needed to operate the flashboards. Typically, the bottom of the bridge beams would be set at the same elevation as the crest of the dam. Substantial piers would be needed for the bridge. These piers would reduce the effective crest length of the spillway and thus the capacity of the spillway.

If the spillway is constructed of roller compacted concrete, special protection of the spillway floor may be necessary to help prevent or control erosion of the concrete surface from the water cascading over the flashboards.

For a dam of the size and importance of the Tongue River Dam, a gate system other than flashboards would be more typical if gates were deemed to be desirable. Two such systems are described below.

The first gate system is a lift gate system. A typical installation would consist of rectangular slide gates or radial gates. These gates can be raised or lowered to control releases over the spillway. The gates are typically made of heavy steel members and require extensive maintenance. A bridge and heavy lifting mechanisms are required.

The second gate system involves gates that are pushed up from within the spillway crest. These gates range from inflatable rubber dams to steel plates controlled with hydraulic rams. Since a bridge is not required with such a system and maintenance costs are lower, they may be more economical than a lift gate system.

With any gate system, a considerable reliance is placed on the judgement of the operator to ensure that the gates are raised and lowered at the correct time. On large dams with power plants associated with the project, full time employees are available to operate the spillway gates. Tongue River Dam must rely on a part time dam tender. The dam tender may be busy with other matters during a flood event, increasing the possibility of improper gate operation.

APPENDIX I

DRAFT SECTION 404(B)(1) EVALUATION

APPLICANT: Montana Department of Natural Resources and Conservation

APPLICATION NUMBER:

PROJECT: Tongue River Basin Project

INTRODUCTION

The Section 404(b)(1) Guidelines, found in Title 40 CFR, Part 230, are the substantive environmental criteria in light of which all proposed discharges of dredged or fill material to waters of the United States are evaluated under Section 404 of the Clean Water Act. The intent of the Guidelines is to restore and maintain the chemical, physical and biological integrity of waters of the United States through the control of discharges of dredged or fill material. Central to the 404(b)(1) review is the precept that no discharge of dredged or fill material should be permitted unless it can be demonstrated that the discharge will not have an unacceptable adverse impact, either individually or in association with other discharges, on the aquatic ecosystem. The determination of compliance with the Guidelines is made by the application of four restrictions found in Subpart B. These restrictions state that:

a) No discharge shall be permitted if there is a practicable alternative which would have less adverse impact on the aquatic ecosystem as long as the alternative does not have other significant adverse environmental consequences.

b) No discharge shall be permitted if it violates state water quality standards, violates toxic effluent standards or prohibitions under Section 307 of the Act or jeopardizes the continued existence of threatened or endangered species as identified under the Endangered Species Act of 1973.

c) No discharge shall be permitted if it will cause or contribute to the significant degradation of waters of the United States.

d) No discharge shall be permitted unless appropriate and practicable steps have been taken to minimize potential adverse impacts to the aquatic ecosystem.

Through these restrictions the Guidelines set forth the principle that avoidance of adverse impacts to the aquatic ecosystem is the highest priority and, for those adverse impacts which can not be avoided, minimization is required. Finally, mitigation may be required to offset remaining adverse impacts and bring a proposed project into compliance with the Guidelines.

The factual determinations used to assess compliance with the four restrictions are found in paragraph 230.11 of Subpart B. Subparts C-F identify specific chemical, physical and biological effects and impacts which must be considered in making the factual determinations. All are embodied in this review of the proposed project.

PROJECT DESCRIPTION

A. Location

The Tongue River's headwaters are located in Wyoming's Bighorn Mountains. The stream flows northeast approximately 290 miles through north-central Wyoming and eastern Montana before emptying into the Yellowstone River at Miles City. Tongue River Dam and Reservoir are located in Big Horn County, Montana, about 5 miles from the Montana/Wyoming border. Ashland, Montana is 60 miles away; Sheridan, Wyoming is 30 miles away. The Northern Cheyenne Reservation lies about 15 miles north of the dam.

B. General Description

The Tongue River Valley formed as the river and its tributaries eroded through parts of the Fort Union Formation. Topography of the area ranges from the flat river valley and benches to surrounding steep and eroded terrain. The area is sparsely populated with ranching and coal mining serving as the basin's primary industries.

Tongue River Dam and Reservoir were constructed in 1940. The reservoir is about 8 miles long, 1 mile wide and has an average depth of 20 feet. The reservoir provides both irrigation water and recreational opportunities. It is administered by the Montana Department of Natural Resources and Conservation which is proposing to reconstruct the primary spillway and stilling basin. The existing low-level outlet works will be rehabilitated and

an auxiliary low-level outlet works will be installed. Although completion of the work will lower the dam crest by approximately 13 feet, the reconfigured structure will increase the reservoir's capacity from 67,000 acre-feet to 80,000 acre-feet. Maximum reservoir surface area will increase by approximately 400 acres to 3,612 acres.

C. Authority and Purpose

In 1980 the Tongue River Dam was identified by the U.S. Army Corps of Engineers as unsafe. Since that time the reservoir has been operated at decreased levels in order to provide an extra margin of safety to individuals and property downstream. One purpose of the proposed work is to correct dam deficiencies and alleviate the threat to downstream residents and property.

Another reason for the proposed work is to assure that adequate storage exists in the reservoir to satisfy all existing water rights held there.

In 1991 the Northern Cheyenne Tribe and the state of Montana entered into the Northern Cheyenne-Montana Water Rights Compact. This agreement, subsequently ratified by Congress, provides the Northern Cheyenne with the right to up to an additional 20,000 acre-feet of water annually. Completion of the proposed work will permit both the state and the federal governments to meet legal obligations to supply this additional water by providing additional storage capacity in the reservoir.

For a more complete discussion of purpose and need refer to the environmental impact statement, **Chapter 1**.

D. General Description of Dredged and Fill Materials

1) General Characteristics of the Material

Completion of the proposed work will require the placement of earth, aggregate, concrete, riprap and steel fills in Tongue River Reservoir, in the Tongue River below the dam, in Pike Pond and in wetlands associated with the reservoir. Fills will be associated with primary spillway rehabilitation, cofferdam construction, construction of the emergency spillway, stilling basin reconstruction, repair of the low-level outlet works, installation of an auxiliary low-level outlet works and erosion protection. Other fills will be associated with access road construction and county road relocation. Construction of new boat ramps at PeeWee Point and Campers' Point will require fill placement as will mitigation efforts.

2) Quantities of Fill Materials

Below is an estimate of required fill types and quantities for the proposed work:

- Primary spillway and stilling basin reconstruction will require approximately 54,000 cubic yards (cy) of fill with about 5,000 cy placed below ordinary high water (OHW). Fills will include aggregate, rock, cement and reinforcing steel.

- Completion of the proposed work will require construction of two, or possibly three, cofferdams. The cofferdam to be constructed immediately upstream of the primary spillway will require the placement of 55,000 cy of earth, sand, gravel and rock fill. It is anticipated that 40,000 cy of this material will be below OHW. The structure will consist of sheetpile backed by the fill material. Some of the rock fill for this cofferdam will be supplied by the excavation of 35,000 cy of material from the reservoir bed within the dewatered area. Excess material from the excavation will be disposed of at an upland site. Should a slurry cut-off wall or a grout curtain be constructed as a foundation for the cofferdam, both excavation and fill quantities will be significantly reduced. A slurry cut-off wall would require the excavation of 15,000 cy of material from the reservoir bed and replacement of that material with a similar quantity of a soil-cement-bentonite mix. The cofferdam would then be constructed on top of this cut-off wall which would be left in place at project completion. No excavation would be necessary for the construction of a grout curtain. Instead, a cement-water mix would be injected into the bedrock prior to cofferdam construction.

  A cofferdam to be constructed downstream of the primary stilling basin will require 2,000 cy of earth, sand, gravel and rock fill. Most of this material will be below OHW.

  Should dewatering of the existing tunnel of the low-level outlet works be necessary, construction of an additional upstream cofferdam will be required. This cofferdam would consist of 120,000 cy of earth, sand, gravel and rock with an estimated 100,000 cy of this fill below OHW. Sheetpile would be placed on the upstream face of the structure and possibly on the downstream face as well. The excavation of up to 100,000 cy of material from the reservoir bed in the dewatered area may be associated with the construction of this cofferdam. Both excavation and fill quantities would be reduced if a slurry cut-off wall or a grout curtain is constructed as a foundation for the cofferdam.

- Ten thousand cy of rock, gravel or roller-compacted concrete erosion protection will be placed on the

upstream face of the dam around the auxiliary spillway inlet. All this fill will be below OHW. The dam face will be excavated to accept this fill. Construction of the auxiliary spillway tailrace channel may require a limited amount of excavation below OHW at the confluence with the existing tailrace channel. Two small wetlands below the dam, each approximately .04 acres in size, will be filled as part of this work or other work associated with dam rehabilitation.

- If rehabilitation of the existing low-level outlet works is necessary, the placement of up to 2,000 cy of concrete and 78 tons of reinforcing steel will be-required. One hundred cy of concrete will be required for the construction of an auxiliary low-level outlet works through the left abutment. In addition, construction of this auxiliary outlet will require the dredging of 20,000 cy of reservoir bed material for an approach channel to the inlet. A portion of this dredging will occur in the area dewatered by the upstream cofferdam. However, the majority of the dredging will occur outside of the cofferdam area and will be completed from a barge. Some or all of this dredged material may be removed for use elsewhere; any remaining material will be spoiled in the reservoir.

- By raising reservoir levels four feet, additional areas will be subjected to wave erosion. The applicant proposes to place 91,000 cy of end-dumped riprap along the shoreline in the upper reservoir area to reduce erosion along Highway 314, Decker Coal Company property, bridges and culverts. Most, but not all, riprap fill areas are above OHW. Areas will be contoured prior to riprap placement.

- A road will be constructed to permit workers and equipment to access the work area upstream of the downstream cofferdam Approximately 5,000 cy of rock and gravel will be placed below the tailrace OHW.

- Two crossings will be constructed below the dam. A temporary crossing will be constructed across the tailrace. This will be a culverted crossing and will require 5,000 cy of rock and gravel fill below OHW. Should a bridge be installed instead of a culverted crossing, fill materials would be similar to those used for the culverted crossing but quantities would be significantly reduced. A permanent crossing, to provide access to the dam, gate houses and the east side of the reservoir, will be constructed across the primary spillway. Nine thousand cy of earth, sand, gravel and rock fill will be required with 1,000 cy of this material placed below OHW.

- As part of the work associated with the relocation of County Road 380, fills will go below reservoir OHW at three locations. The first location is at Monument Creek where relocation work is intended to remove a sharp curve. It is anticipated that up to 800 cy of the new road embankment, consisting of earth, sand, gravel and rock, will be below OHW. Wetland impacts at this location will total .17 acres. Several hundred cy of fill will be associated with the road crossing at the mouth of Leaf Rock Creek. Three onehundredths of an acre of wetland will be filled at this location. Two other short reaches of the road, between mileposts 6.9 and 7.0, may go below OHW. Up to 300 cy of material may be placed below OHW at these locations. No wetlands will be impacted by these two fills.

- Boat ramp construction at PeeWee Point will require that 200 cy of material be excavated from below OHW and replaced with 200 cy of concrete. Recontouring of the new shoreline at PeeWee Point will involve relocating 50,000 cy of earth of which 10,000 cy will be below OHW. Ramp construction at Campers' Point will require the excavation of 300 cy of material and replacement with a similar quantity of concrete.

- Aggregate mining will occur at Campers' Point where 460,000 cy of aggregate and overburden will be removed.

- Approximately one acre of the aggregate mine site is below existing OHW. The Department of Fish, Wildlife and Parks intends to utilize the aggregate pit as a marina after mining has been completed. This will require moving 220,000 cy of substrate to shape the pit into a form suitable for use as a marina. Reclamation will likely occur after the reservoir floods the pit and then recedes. Therefore, the pit will be a part of the reservoir when reclamation occurs. It is estimated that in excess of 90,000 cy of material below OHW will be moved as part of the grading work. Excavation of approximately 55,000 cy of additional material from the pit may be associated with reclamation work. Approximately 100,000 cy of overburden will be used to construct a peninsula extending into the reservoir from the marina area to serve as a breakwater and to provide fishing access. The fill material will be clay, sand and rock. Minor reclamation work could also occur at Sand Point where 200 cy of sand might be salvaged from the swimming beach. All mining and reclamation work will be completed in-the-dry at low pool.

- A number of efforts will be made to offset adverse project impacts to aquatic resources. Some of these mitigation efforts will require fill placement in Section 404 jurisdictional waters. An effort to reinforce the bank at Pike Pond and enlarge the pond will require the placement of 8,800 cy of earth below OHW. Small fills will occur as part of the fishery mitigation work. These fills will be associated with such things as habitat creation, spawning bed development and fish ladder construction.

3) Sources of the Fill Materials

All project fill material will be obtained from commercial sources and borrow sites in the immediate project area. All material will be free of contaminants.

E. Description of the Proposed Discharge Sites

1) Location of the Sites

Completion of the proposed work will require the placement of fill material in Tongue River Reservoir, in the Tongue River, in Pike Pond and in wetlands associated with the reservoir. Most fills will be in the immediate vicinity of the dam and will be directly associated with dam and spillway rehabilitation. However, some erosion protection fills will be necessary in the upper reaches of the reservoir. Drainages and wetlands impacted by mitigation fills will be in the vicinity of the reservoir.

2) Size of the Sites

The largest fill areas are in the vicinity of the dam. The dam is 91 feet high and 1,824 feet long. Excavation and fill work associated with the construction of an auxiliary spillway will take place on both the upstream and downstream sides. Much of the work on the dam will occur above OHW. Reservoir levels will be lowered to permit dam work and construction of the upstream cofferdam to be completed in-the-dry.

With the cofferdam in place, the primary spillway will be reconstructed. The new spillway will be on the centerline of and as long as the existing spillway. It will not be as wide as the existing spillway. It will lead to a concrete stilling basin 90 feet long by 100 feet wide. An earthen cofferdam approximately 100 feet long will be constructed across the channel just below the dam to permit construction of the stilling basin in-the-dry.

Mining activity at Campers' Point will disturb an area several acres in size. Approximately one acre is below existing OHW. However, reclamation of the pit will be completed after the new reservoir OHW has been established, making the pit part of the reservoir at the time of reclamation. The peninsula to be constructed at Campers' Point will approach an acre in size.

Fill areas associated with the various road crossings, road relocations and access fills will vary in size with the largest covering approximately 5,000 square feet. The four construction related wetland fills will range in size from .03 acres to .17 acres.

Erosion protection fills in the upper reaches of the reservoir to protect Highway 314, Decker Coal Company property, bridges and culverts will occur at various places. Individual sites will range in size from several hundred to several thousand square feet. A total of 91,000 cy of riprap will be required. Most of this riprap will be placed above the existing OHW.

Boat ramps will be constructed at PeeWee Point and Campers' Point. The fill areas for each of these ramps will be several thousand square feet.

Fills associated with fishery mitigation work will occur in the reservoir and/or in the Tongue River. Individual fill sites will range in size from a few square feet to several thousand square feet. Wetland mitigation work will require fill placement in Pike Pond in order to reinforce and enlarge the dike that separates the pond from the reservoir. The fill area will total less than one acre.

3) Types of Aquatic Resources

Tongue River Reservoir is a shallow, warm-water impoundment. It supports a significant recreational fishery of primarily warm water species. Since the storage of irrigation water is one of its purposes, reservoir surface elevations fluctuate significantly with the highest elevations occurring in late spring and early summer and lowest elevations occurring in winter and early spring. Since the dam was found to be unsafe in 1980, maximum reservoir storage has been limited to 40,000 acre-feet instead of the design capacity of 67,000 acre-feet. The reservoir bed is primarily silt with some sand and gravel.

The Tongue River is a warm-water stream, although it does support a population of brown and rainbow trout for a short distance below the dam. It is generally a shallow stream the width of which varies from about 40 feet to about 80 feet. The stream bed is a mix of silt, sand and gravel. Average flow below the dam is 444 cubic feet per second (cfs). Average flow at Miles City is 420 cfs. The average annual discharge of the stream below the dam is 321,500 acre-feet. At Miles City the average annual discharge is 304,300 acre-feet. Flows at Miles City are lower than dam releases during the May to September irrigation period due to irrigation water withdrawals. October to April flows at Miles City are higher than dam releases as a result of contributions from tributaries and an absence of irrigation withdrawals.

In addition to the wetland fills identified above, the raising of the reservoir will flood 314 acres of wetland. This figure includes 160 acres of sandbar willow wetland, 94 acres of water smartweed wetland, 6 acres of cattail marsh, 3 acres of tufted foxtail wet meadow and 51 acres of wetland characterized by mixed vegetation including species such as sandbar willow, common spikesedge and prairie cordgrass.

4) Timing and Duration of the Discharge

The construction schedule calls for initial stilling basin work to begin in June 1997. The placement of roller-compacted concrete or rock on the dam face will begin in August of 1997. Completion of this phase of work is scheduled for November 1997. Reservoir drawdown to elevation 3390.5 will begin in October 1997 so that cofferdam construction across the inlet and outlet of the spillway can be completed. Spillway fills will begin in November 1997 with completion scheduled for July 1998. Low-level outlet works fills will be placed between November 1997 and January 1998. The construction schedule may be altered to accommodate such things as weather delays and specific environmental concerns. Riprap placement for erosion protection in the upper reaches of the reservoir will occur prior to raising of reservoir surface elevation to 3428.4 feet in the spring of 1999.

Fills associated with mitigation work will begin shortly after dam rehabilitation has been completed.

F. Description of Disposal Method

Roller-compacted concrete, earth and aggregate for cofferdam construction will be placed using heavy equipment or conveyors. Concrete for the primary spillway and stilling basin will be poured in place. Reinforcing steel will be placed manually or by heavy equipment. Riprap will be end-dumped and then distributed over the fill areas with heavy equipment. Fills associated with mitigation work will be placed with heavy equipment.

FACTUAL DETERMINATIONS

A. Physical Substrate Determinations

1) Substrate Elevation and Slope

The roller-compacted concrete or rock placed on the face of the dam will not cause a change in substrate elevation since the face of the dam will be excavated to receive this material. Substrate slope will remain the same.

Substrate elevation and slope will be changed in the areas of cofferdam construction. This is necessary to isolate and dewater the work area. This will be a minor and short-term impact since cofferdams will be removed at work completion with the possible exception of up to 10,000 cy of fill associated with the largest cofferdam which will be constructed only if it becomes necessary to dewater the low-level outlet works to complete repairs.

Spillway and stilling basin fills will change substrate elevations. To increase the reservoir's storage capacity, the spillway crest will be raised four feet. While the direct effects associated with this work will be minor and permanent, indirect effects will be significant and permanent in that additional substrate will be created by the higher water levels. Stilling basin construction will require the excavation of the stream bed to a depth of about 15 feet. The depression will then be permanently lined with concrete. Changes associated with access fills will be moderate in significance and temporary.

Permanent changes in substrate elevation and slope will result from fills associated with road relocation work. Fill areas will be small and impacts will be minor.

Work for both the riprap erosion-protection and boat ramp construction will require limited amounts of both cut and fill to contour the substrate prior to fill placement. Changes to substrate elevation and slope as a result of these fill placements will be minor and permanent.

A number of different types of fills are anticipated as part of the mitigation work. Some will change substrate elevation in minor ways as would be the case with the placement of boulders in the river as fish habitat enhancement. Others, such as the raising of the dike at Pike Pond, will result in greater impacts.

2) Comparison of Fill Materials and Substrate at Discharge Sites

The substrate at all discharge sites is composed of silt, clay, sand or gravel or a combination of these. Substrate changes will occur with the placement of earth, concrete, riprap and steel fills. Most of these changes will be minor to moderate in significance and permanent, although changes associated with cofferdam fills will be minor and largely temporary. However, should slurry cut-off walls be constructed as foundations for the cofferdams, they would be left in place at work completion, resulting in a permanent and minor substrate change.

3) Fill Material Movement

Aside from the limited erosion of some of the finer textured fill materials during and immediately after construction, all fills will be stable. Adverse impacts associated with fill material movement will be minor and temporary.

4) Physical Effects on the Benthos

Benthic populations in fill areas will be lost as a result of fill placement. Impacts will be minor and permanent with the exception of losses associated with temporary fills, the removal of which will permit recolonization of both the fill areas and those areas dewatered by placement of the temporary fills. With the expansion of the reservoir, additional habitat will be available to benthic organisms.

5) Erosion and Accretion Patterns

Eleven miles of reservoir shoreline are actively eroding. By raising the maximum reservoir levels four feet, an additional three miles of shoreline will be subject to wave erosion. As a result, both reservoir and stream accretion rates will permanently increase to a limited extent. Similar impacts will be associated with the erosion of finer-textured particles from the temporary fills and disturbed soils in the work areas. These will be minor and short-term impacts since temporary fills will be removed and disturbed soils will be revegetated at work completion.

Project impacts on stream bank erosion rates and stream accretion patterns will be minor.

6) Cumulative Effects

Aside from the creation of additional substrate as a result of raising reservoir levels, the effect of project fills on reservoir substrate will be minor to moderate in nature. Although most of the substrate impacts will be in the immediate vicinity of the dam, others will be dispersed around the reservoir and in the river below the dam. For these reasons cumulative substrate effects will not be significant although they will be both temporary and permanent.

7) Action Taken to Minimize Impacts to the Substrate

All fill material will be clean and free of contaminants. Fills will be limited to quantities necessary to complete the work and will be placed in a manner so as to cover a minimum of substrate. Much of the earth fill will be similar to the existing substrate. Most, if not all, temporary fills will be removed at work completion and original bottom contours will be reestablished.

B. Water Circulation and Fluctuation

1) Water Chemistry

Much of the fill material for the proposed project will come from the immediate area. Since the soils of the area are alkaline, it is reasonable to expect that minor changes in the water's pH and salinity levels will occur with fill placements. These will, however, be very localized and temporary impacts.

The finer-textured soil particles suspended in the water by construction activity will alter water clarity and color. While these effects will be most significant near the fill areas, they will extend downstream to some degree as the soil particles are dispersed by the current. Impacts are expected to be minor and temporary. In a similar manner, water clarity and color will be altered to a very limited extent by increased shoreline erosion rates after project completion.

Since all fill material will be clean and free of contaminants, unusual quantities of organics and nutrients will not be introduced and dissolved oxygen levels should not change as a result of introduced materials. However, lowering reservoir levels to 9,000 acre-feet to permit cofferdam construction may reduce dissolved oxygen levels to the extent that fish populations are affected.

The odor and taste of the water will not be changed by completion of the work.

Completion of the work will have no effect on eutrophication.

2) Current Patterns and Circulation

Shortly after construction begins, the reservoir will be drawn down to 9,000 acre-feet to permit construction of the cofferdams. Reservoir surface elevation will then be increased to the maximum safe level, approximately 45,000 acre-feet, which will permit operation of the reservoir in a manner that is consistent with historic operation. With the construction of cofferdams across the mouth of the spillway and downstream of the stilling basin, water will not circulate through the work area.

Flows into the reservoir will not be affected by the proposed work. During the construction period, flows around the work area and out of the reservoir will be maintained by use of the low-level outlet works or an auxiliary low-level outlet works. Flows downstream of the dam will be maintained at 190 cfs or, at a minimum, at a rate equal to reservoir inflow.

Completion of the proposed work will extend the reach of the reservoir by one mile causing the inundation of approximately 400 additional acres and causing the loss of 314 acres of wetland.

Construction impacts to current patterns and circulation will be moderate to major in significance and temporary with the exception of the extended reservoir reach and the inundation of wetlands. These will be significant and permanent impacts.

Project impacts to drainage patterns, stratification and aquifer recharge will be negligible to minor and temporary.

3) Normal Water Level Fluctuations

Although the reservoir is designed to hold 67,000 acre-feet, maximum storage has been limited to 40,000 acre-feet for the last 18 years. With completion of the proposed work, storage capacity will be increased to 80,000 acre-feet. With this additional storage, first priority will be given to meeting demands for irrigation water of up to 60,000 acre-feet. If demands fell short of this, remaining water would continue to be held in the reservoir.

Under the proposed operating scenario, there will be changes in average minimum and maximum surface elevations. Historically the average minimum surface elevation has occurred in December and has been 3401.9 feet. The average maximum elevation has occurred in June and has been 3418.9 feet. Under the proposed operating scenario, the average minimum surface elevation would be 3419.7 feet and would occur in October with the average maximum elevation of 3427.6 feet occurring in June. Historically surface elevations have increased from February through June and decreased from July through October. Elevations have remained fairly constant November through January. Under the proposed scenario, storage would begin in November and continue through June. Irrigation releases would begin in July and continue through October. Historically the reservoir surface elevation has dropped 5.1 feet per month from July through September in an average year. With the proposed operations, the surface elevation would drop 2.4 feet per month between July and September in an average year.

The overall impact of completing the work will be consistently higher reservoir surface elevations and less fluctuation than has historically been the case. This will generally be a significant and beneficial permanent impact on aquatic organisms.

During construction the target for releases from the reservoir will be 190 cfs, a flow which will be sufficient to satisfy demands for irrigation water. During those periods when 190 cfs releases cannot be maintained, releases will equal reservoir inflow. This will mean slightly higher than normal releases during spring runoff and slightly lower than normal releases in mid-summer. Peak stream flows below the dam will be greater than historic flows due to the fact that excessive inflow will not be stored in the reservoir.

After construction, and with full development of the Tribe's water right, flows below the dam will be slightly less than historic flows from fall to late spring. Flows will be slightly higher than historic flows from late spring through June. They will approximate historic flows the rest of the year. Should Wyoming fully develop its Yellowstone River Compact water, an action which is not reasonably foreseeable, flows below the dam would be further reduced in late spring and early summer.

With completion of the work, stream flows during flood events will be increased to a minor degree. The extent of the floodplain will also increase slightly.

With completion of the proposed work and full development of the Tribe's water right, flows at Miles City will be slightly less than historic flows during much of the year. During irrigation season, however, the impact on flows will be more significant. If additional withdrawals result from the full development of Wyoming's Yellowstone River Compact water, Miles City flows will approximate historic flows except for April through September when they will be noticeably reduced.

As identified above, impacts to flows below the dam during construction will be minor to moderate in significance and short-term. Postconstruction impacts to flows below the dam will be minor, assuming no further development of Wyoming's compact water. Probable impacts to flows at Miles City will be minor to moderate and permanent except during irrigation season when impacts will be magnified. This also assumes no further development of Wyoming's compact water.

4) Salinity Gradients

Salinity gradients are found where fresh and salt water mix. The concept is not applicable to this project.

5) Cumulative Effects on Water Circulation and Fluctuation

The cumulative effects of the proposed work on water circulation and fluctuation will be significant, primarily beneficial and largely permanent.

6) Actions Taken to Minimize Impacts

All fills will be of clean material and limited to quantities necessary to complete the work in order to minimize the restriction of circulation. Most temporary fills will be removed at work completion. Flows into and through the reservoir will be maintained during construction. Flows below the dam will be maintained at or near historic levels both during and after construction, with the exceptions identified above.

C. Suspended Particulate/Turbidity Determinations

1) Expected Changes in Suspended Particulate and Turbidity Levels in the Vicinity of the Discharge Site

The Tongue River Reservoir is a turbid water body. This is a result of turbid inflow and shoreline erosion associated with fluctuating water levels. Completion of the proposed work will increase suspended particulate and turbidity levels in the vicinity of the discharge sites. This temporary impact will be minor and localized since the outlet works' intake is adjacent to the primary fill area. This will allow the highly turbid water to be conveyed from the fill area and discharged to the river below the stilling basin. The effect of discharging the turbid water to the stream will be minimal. Suspended particulate increases associated with boat ramp construction and riprap placement will be minor and temporary.

2) Effects on Chemical and Physical Properties of the Water Column

During the construction period, and particularly during the period the temporary fills are in place, light penetration through the water column will be reduced by the increased levels of suspended particulates near the fill areas.

There will also be an adverse aesthetic impact associated with increased turbidity adjacent to the fills. The discolored water associated with this turbidity is not likely to extend far beyond the work area, with the minor exception of a plume created by the discharge of the water to the river below the work area.

Project impacts to light penetration and the aesthetic value of the water column will be minor and largely limited to the construction period. It is not anticipated that increases in suspended particulate levels will reduce photosynthesis to the extent that dissolved oxygen levels will be noticeably reduced. No pathogens will be introduced into the reservoir or stream by the fill materials.

3) Effects on the Biota

Algae and rooted aquatic plants in the vicinity of the fills will be adversely affected by the reduction in light penetrating the water column. Since photosynthesis is

dependent on light, there will be less photosynthesis during the period of increased turbidity levels. As a result, it is likely that aquatic plant populations in the immediate work area will decline during the work period. This will be a minor and temporary impact since the size of the affected area will be limited and turbidity levels will return to normal at work completion, allowing plant populations to return to normal.

Populations of species that either directly or indirectly depend on primary production will also be adversely affected by the work. Any filter-feeder populations in the fill areas will likely decline during construction as a direct result of fill placement or as a result of greater difficulty finding food in the less productive environment. Sight-feeding populations will also have difficulty finding food, although many individuals will be able to migrate away from the work area to less turbid locations. General project impacts on the biota as a result of increased suspended particulate and turbidity levels will be minor and limited to the construction period.

4) Cumulative Effects

Most of the suspended particulate effects associated with the discharges will be limited to the dam area and the river just below the dam. Although several different discharges will occur in this area, the cumulative effects of increased turbidity levels will be minor to moderate and temporary. Turbidity impacts associated with boat ramp construction and riprap placement will be minor and temporary and will not significantly raise the level of cumulative project impacts.

5) Actions Taken to Minimize Impacts

All fill material will be clean and free of contaminants and limited to quantities necessary to complete the work. Reservoir levels will be lowered so that temporary fills can be placed in-the-dry. Most temporary fills will be removed at work completion. All concrete fills associated with spillway and stilling basin construction will be placed in-the-dry. Riprap placement and boat ramp construction will also be completed when reservoir levels are below the fill areas. Contractors will implement a plan to control surface erosion in work areas in order to prevent eroded soil particles from reaching the water.

D) Contaminant Determinations

The following information has been considered in evaluating the biological availability of possible contaminants in the fill material:

a) Physical characteristics of the fill material.

b) Hydrography in relation to known or anticipated source of contamination.

An evaluation of the appropriate information in item a, above, indicates there is reason to believe the proposed fill material is not a carrier of contaminants or that levels of contaminants are substantively similar at extraction and disposal sites and not likely to contaminate. Therefore, the material meets the testing exclusion criteria.

E. Aquatic Ecosystem and Organism Determinations

1) Effects on Plankton, Benthos and Nekton

Changes in the aquatic environment in the vicinity of the fills will adversely impact plankton populations which will likely decline during the work period as a result of suspended particulate increases. Benthic organism populations in the reservoir will be adversely affected by reservoir drawdown for construction. Additional impacts will result from the temporary loss of habitat associated with fill placement and the dewatering of work areas. Mobile aquatic species will be less affected since they will be able to migrate away from the disturbances. However, by lowering the reservoir pool to 9,000 acre-feet in the fall and maintaining this low level until the spring of the following year, it is expected that reservoir fish populations will be adversely affected.

Plankton populations in the river below the dam will also be affected by suspended particulate and turbidity increases. Impacts to benthic organisms and other aquatic life will be negligible since construction releases will approximate historic flows.

Project impacts to aquatic species during the construction period will be minor and temporary with the possible exception of impacts to fish populations both in the reservoir and immediately below the dam. Should they occur, such impacts could be moderate to significant. With the completion of construction and the establishment of a higher and more stable reservoir pool, all aquatic species will experience permanent and significant benefits.

2) Effects on the Aquatic Food Web

The project will affect the different levels of the aquatic food web. As identified above, populations of plankton and benthic organisms will decline. As a result, higher level species which depend on them for food will be stressed. This effect will continue up the food web to the highest levels. Effects will be minor to moderate and largely limited to the construction period.

3) Effects on Special Aquatic Sites

Direct project impacts to wetlands will total less than one acre. Indirect impacts to both wetlands and riffle and pool complexes will also occur. The wetlands to be indirectly affected are primarily located at the upper end of the reservoir. These wetlands will be permanently inundated as a result of project completion and higher reservoir levels. The wetland types included in this group are sandbar willow wetlands, water smartweed wetlands, cattail marsh and tufted foxtail wet meadow. An additional wetland type is composed of mixed vegetation and includes species such as sandbar willow, spikesedge and prairie cordgrass. As a result of project completion, 314 wetland acres will be permanently inundated. This includes 160 acres of sandbar willow wetlands 94 acres of water smartweed wetlands, 6 acres of cattail marsh, 3 acres of tufted foxtail wet meadow and 51 acres of mixed vegetation wetlands. Several hundred acres of similar wetlands are expected to naturally regenerate with the establishment of new reservoir levels.

Wetland losses will be permanent and significant. Impacts to riffle and pool complexes will be of moderate significance and temporary because construction-related releases will equal reservoir inflows or, if possible, 190 cfs.

4) Effects on Threatened and Endangered Species

The Fish and Wildlife Service has identified the bald eagle, the peregrine falcon, the piping plover, the least tern, the pallid sturgeon and the black-footed ferret as threatened or endangered species occurring or potentially occurring in the project area. A biological assessment prepared for this project by the Bureau of Reclamation concluded that no adverse effects will result to these species as a consequence of the proposed work as long as certain coordination measures identified in the assessment are implemented. The assessment also concluded no adverse effects will result to any candidate species in the project area. The Fish and Wildlife Service has concurred in the findings of the Bureau's assessment.

5) Effects on Other Wildlife

In addition to the extensive acreage of woody riparian habitat that will be lost to the project, it is estimated that 140 acres of grassland and 25 acres of scrub forest will be inundated. Residents of these habitats include white-tailed deer, mule deer, sharp-tailed grouse, raccoon, striped skunk, coyote, red fox, porcupine, prairie rattlesnake, various rodents and numerous other species. These species will be displaced as water levels rise. This is potentially a significant effect, although similar habitat will slowly regenerate along the new shoreline.

Numerous species of waterfowl use the reservoir during the migration season. Some species are known to nest on the reservoir. Double-crested cormorants and great blue herons are also inhabitants of the reservoir. The greatest potential for impacts to these species is with the temporary drawdown of the reservoir to 9,000 acre-feet. It is not anticipated that this will be a significant effect, however, since it will occur in the fall and winter months and the reservoir will again be filled to historic levels in the spring for the migration and nesting season. With project completion, these species will be significantly benefited. Similar impacts will result to furbearers.

6) Cumulative Effects

While project impacts to the individual components of the aquatic ecosystem will vary from minor to significant, cumulative effects will be significant largely due to impacts on wetlands and potential impacts to fisheries. Cumulative effects will be primarily short-term although the loss of the wetland acreage will be permanent. Completion of the work will have a primarily beneficial effect on most components of the aquatic ecosystem.

7) Actions Taken to Minimize Impacts

Fill material will be clean and free of contaminants and limited to quantities necessary to complete the work. Flows will be maintained through the reservoir and downstream of the work area. The reservoir drawdown period will be minimized to limit impacts to fisheries. A mitigation plan will offset impacts to fisheries, wetlands and upland habitat. Since it has been determined that several hundred acres of wetland will regenerate naturally with the establishment of new reservoir levels, the

wetland mitigation plan has been designed to offset the losses of functions and values associated with those wetlands not expected to regenerate. Fish populations in the reservoir and in the river will be monitored and restocking will take place as necessary.

F. Proposed Disposal Site Determinations

1) Mixing Zone Determinations

Most fills will occur over a 12-month period from August to July of the following year. These fills will be localized in the dam area and will be placed by end-dumping and by use of heavy equipment. Most will occur in-the-dry since cofferdams will prevent reservoir and stream water from entering the work area. Other fills, such as those for boat ramp construction or erosion protection will also occur in-the-dry. Concrete, steel and riprap fills will be stable with no erosion or mixing anticipated. Any earthen fills exposed to wave action will be susceptible to erosion and, therefore, there will be a mixing zone associated with these fills. However, most earthen fills will be faced with sheetpile to limit erosion. Project mixing zones will be limited in extent and are acceptable.

2) Actions Taken to Minimize Adverse Discharge Effects

All appropriate and practicable steps have been taken, through the application of recommendations in Sections 230.70 to 230.77, to assure minimal adverse effects of the proposed discharges. These steps include placing fills in-the-dry to limit turbidity; placing the minimum amount of fill material necessary to complete the work; using fill material that is similar to existing substrate; locating cofferdams in a manner that limits the extent of dewatering; maintaining flows into the reservoir and downstream of the dam; using fills that are free of contaminants in other than trace amounts; removing most temporary fills at work completion; placing physical barriers during construction to prevent eroded soil particles from entering the water; reclaiming and stabilizing disturbed areas at work completion; completing mitigation to offset adverse impacts to wetland habitat and aquatic and upland populations.

3) Determination of Compliance with Applicable Water Quality Standards

The Montana Department of Environmental Quality has certified that the proposed work will not, in its opinion, violate applicable water quality standards. This certification is considered conclusive with respect to water quality.

4) Potential Effects on Human Use Characteristics

Drawdown of the reservoir to 9,000 acre-feet for approximately four months could potentially adversely affect the reservoir fishery to a significant degree. Such reductions in fish populations could adversely affect recreational opportunities. To compensate for any losses identified by monitoring, restocking will occur as necessary.

The appearance of the reservoir will be temporarily diminished during construction. With completion of the work and refilling of the reservoir, the aesthetic quality of the site will be similar to preconstruction conditions.

The reservoir and surrounding land comprise Tongue River State Park. The park is used for boating, fishing, swimming, camping, hiking and other recreational activities. Construction efforts will reduce the quality of recreation available at the park during the work period since access to various locations will be impeded. Completion of the work and the associated higher water levels will necessitate the relocation of less than one mile of park road, the relocation of a swimming beach, the construction of replacement boat ramps and the relocation of sewage facilities, picnic shelters and camp sites. To minimize impacts, this recreational mitigation will be completed concurrently with the construction and reclamation phases of the project. Impacts will be minor to moderate in significance and temporary. With work completion, the reservoir will be larger with a more stable surface elevation and will be more useful as a recreational resource. A deep water marina and a new fishing access peninsula will also be available for recreational use.

Aside from the inundation of a well at Campers' Point, no water supplies will be affected by the proposed work. There will be no impacts to national parks, historical monuments, wilderness areas, refuges, sanctuaries or research sites.

G. Determination of Cumulative Effects on the Aquatic Ecosystem

Some effects of the work, such as the restriction of flows and reductions in aquatic populations, will be temporary while others, such as enlarging the reservoir, extending its reach and inundating wetland acreage, will be permanent. Collectively these impacts on the aquatic ecosystem will be significant. The permittee will implement a plan to offset most of the adverse effects associated with completion of the work.

Fills associated with several proposed projects in the Tongue River Basin could exert a cumulative effect on the reservoir and the river. The Tongue River Railroad has proposed to construct a 41-mile rail line from Decker, Montana to Ashland, Montana. Although the route has not been determined, the preferred alternative would locate about 10 miles of the line in the narrow Tongue River Valley below the dam. Five river crossings and a tunnel would be constructed in this 10-mile length.

The Sheridan Area Water Supply Joint Powers Board proposes to enlarge its Twin Lakes water supply. Twin Lakes is located on Goose Creek in the Big Horn Mountains of Wyoming, about 50 miles upstream of Tongue River Reservoir. The proposed project would enlarge two reservoirs and combine them into a single reservoir with a storage capacity of 3,600 acre-feet. Completion of the work will allow the reservoir to store a relatively small additional amount of water.

Additional cumulative effects could result from the further development of Wyoming's Yellowstone River Compact water. However, the state has not proposed any additional projects in the Tongue River Basin and, therefore, additional cumulative effects are not reasonably foreseeable.

The project sponsors are committed to completing 4.6 million dollars worth of fish and wildlife habitat enhancement work in the Tongue River Basin between the Wyoming state line and Miles City. The conceptual plan for this work calls for the placement of fills in streams and wetlands for such things as structures for fish habitat, fish ladders for passage around diversion dams, waterfowl nesting islands and small dikes to impound water. These fills will be relatively limited and spread across a very large area.

The Decker Coal Company has two mines adjacent to Tongue River Reservoir. Reclamation work at these mines is ongoing and may require occasional fill placement in minor drainages. The company monitors the water discharged from the sites to assure water quality standards are met. Decker Coal operations have little impact on the reservoir or the river.

In summary, while a number of other projects are likely to occur in the Tongue River Basin, the individual projects are widely dispersed and it is not anticipated that the cumulative effects of these projects will be significant.

H. Determination of Secondary Effects on the Aquatic Ecosystem

Adverse secondary effects will be minor to major and both temporary and permanent. They include such things as increased turbidity levels, impacts to aquatic and benthic organisms and the loss of wetland functions and values. Mitigation will offset these impacts.

Beneficial secondary effects include the creation of additional aquatic habitat. Additionally, since surface levels will be more stable, the reservoir itself will be improved as habitat. In a similar manner, stream flows below the dam will fluctuate less, improving the stream's habitat value. Aquatic populations are expected to increase as a result of work completion.

FINDINGS OF COMPLIANCE

A. Adaptation of the Section 404 (b)(1) Guidelines to This Evaluation

This evaluation does not deviate from the requirements outlined in 230.10 and all requirements have been met.

B. Evaluation of the Availability of Practicable Alternatives to the Proposed Discharge

The project sponsors have considered a number of alternatives to the proposed work. The preferred alternative has been identified as the one that accomplishes project goals with the least cost and the least environmental damage. The preferred alternative as identified above is the least damaging practicable alternative in terms of cost, logistics and technology. For a more complete review of alternatives, see the environmental impact statement, **Chapter 2**.

C. Compliance With the Applicable State Water Quality Standards

The Montana Department of Environmental Quality has certified that this project will not violate water quality standards. This certification is considered conclusive with respect to water quality.

D. Compliance with Applicable Toxic Effluent Standards or Prohibitions Under Section 307 of the Clean Water Act

No toxic substances will be introduced into the aquatic environment. The work complies with the standards identified in Section 307.

E. Compliance with the Endangered Species Act

The Fish and Wildlife Service has concurred in the Bureau of Reclamation's "no effect" determination relative to threatened and endangered species.

F. Evaluation of the Extent of Degradation of the Waters of the United States

Much of the degradation associated with the proposed work will be limited in extent and duration. However, the loss of wetland acreage as a result of work completion will be a significant adverse effect. The proposed work may also result in significant adverse effects to the recreational fishery and to wildlife. While these effects will be permanent, mitigation efforts will compensate for the impacts.

G. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts on the Aquatic Ecosystem

As identified above, the applicant will take numerous site-specific actions to limit both the individual and cumulative effects of the discharges. In addition, compensatory mitigation will be completed. This will include the creation of wetlands, monitoring and restocking fish populations as necessary and the establishment of a wildlife management area.

H. Findings

On the basis of the Guidelines, the proposed discharges of fill material are specified as complying with the requirements of the Guidelines with the inclusion of appropriate and practical conditions to minimize adverse effects on the aquatic ecosystem. These conditions include site-specific limitations on fill placements and the completion of compensatory mitigation to offset adverse impacts. These conditions have been attached to and made a part of the Section 404 permit.

I. Evaluation Responsibility

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